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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCVI.

A NEW GENUS *GARDNERINA*.

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Among the names of the Eupatorieae unaccounted for in previous studies in this series are *Piqueria angustata* Gardn. and the derived combination *Alomia angustata* (Gardn.) Benth. Existing descriptions indicate a distinctive plant that does not readily fit in any presently known genus of the tribe. Isotype material has now been seen through the courtesy of the New York Botanical Garden, and the distinctive nature of the species has been confirmed.

The two generic names that have been applied to the Brasilian plant are traditional in the Eupatorieae for various members lacking a pappus. *Piqueria*, characterized by a reduced anther appendage, has proven to contain only seven species with 3-5 involucral bracts and an equal number of flowers in the head, and chromosome numbers based in n=12. The genus is restricted to Mexico, Central America, and the West Indies. *Alomia*, which has a fully developed anther appendage, is now known to consist of 4 species in southern Mexico, with distinctive peg-like setae on the achene. The Brasilian species of Gardner does not fall within either of these refined concepts.

The Gardner species is regarded here as a member of the subtribe Ageratinae (Piquerinae) on the basis of its general characters, but is easily excluded from *Ageratum* by its plane receptacle. The shallowly pinnatifid leaf blades and greatly expanded style branches of the Gardner species are further distinguishing characters, and the plant in some ways resembles members of the Adenostemmatinae. The short anther appendages and mostly alternate leaves are useful key characters, and the dense cover of small stipitate glands is notable, but the new genus seems to be most technically though not very keyably distinct from its relatives by the hairs inside the corolla on and near the lower filaments of the anthers. These hairs inside the corolla are not glandular.

In preparing material for microscopic examination, the carpopodium has seemed unusually fragile, often breaking free from the base of the achene in pieces, and leaving a base that seemed to lack a callus. The trait may be an artifact of preservation of the particular specimen. The cells of the carpopodium are rather enlarged with large lumina, but have distinctly thickened walls.

According to the collector, George Gardner, the species

was collected from among limestone rocks in Goias, Brasil, near the Villa de Arrayas. The genus is named here after the collector who is especially well known for his work with the Brasilian flora.

GARDNERINA R. M. King & H. Robinson, gen. nov. Asteracearum (Eupatorieae).

Plantae annuae base decumbentes in caulis foliis pedicellis et bracteis involucri dense minute stipitato-glanduliferae. Caules flavo-virides. Folia base opposita aliter alterna anguste longe petiolata; laminae membranaceae ovatae vel rhomboideae base cuneatae margine repando-dentatae vel pinnatifidae apice breviter anguste acuminatae fere ad basem trinervatae. Inflorescentiae pauci-capitatae cymosae, pedicellis angustatis, bracteis minutis linearibus remotis et subinvolucralibus. Involucrum late campanulatum; squamae involucri 10-12 eximbricatae lanceolatae inferne leniter bicostatae apice anguste acutae; receptacula plana glabra. Flores 12-15 in capitulo; corollae albae? extus in tubis et basis faucum minute stipitato-glanduliferae, tubis base latis superne constrictis, faucibus leniter infundibularibus, lobis breviter oblongo-triangularibus intus dense papillosis extus laevibus et minute glandulo-punctatis, faucibus intus fere ad basem filamentorum et in filamentis puberulis; filamenta in partibus inferioribus cylindracea, cellulis subquadratis vel breviter oblongis in parietibus dense annulate ornatis; appendices antherarum duplo longiores quam latiores leniter bilobatae; basi stylorum glabri vix vel non noduliferi; rami stylorum perlate clavati complanati carnosi. Achaenia subprismatica 5-costata glabra; carpopodia distincta subinflata, cellulis subquadratis vel rotundatis mediocriter inflatis in parietibus distincte leniter incrassatis; pappus nullus. Grana pollinis in diametro 21-23 μm.

Type species: *Piqueria angustata* Gardn.

The genus contains the single following species.

GARDNERINA ANGUSTATA (Gardn.) R.M. King & H. Robinson, comb. nov.
Piqueria angustata Gardn., Lond. J. Bot. 6: 432. 1847.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCVII.

ADDITIONAL NEW COMBINATIONS

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The preparation of a nomenclator for the Eupatorieae has shown the need for a number of combinations overlooked in the previous studies in this series. The tranfers are validated here with minimal notes where well-known names fall into synonymy.

AGERATINA CARMONIS (Standl. & Steyerm.) R. M. King & H. Robinson, comb. nov. *Eupatorium carmonis* Standl. & Steyerm., Publ. Field Mus. Nat. Hist. Chic. Bot. 22: 303. 1940.

AGERATINA REMYANA (Phil.) R. M. King & H. Robinson, comb. nov. *Eupatorium remyanum* Phil., Fl. Atacam. 29. 1860.

AGERATINA VISCOSSIMA (Rolfe) R. M. King & H. Robinson, comb. nov. *Eupatorium viscossimum* Rolfe, Gard. Chron. ser. 3, 39: 274. 1906.

AUSTROEUPATORIUM ROSMARINACEUM (Cabrera & Vittet) R. M. King & H. Robinson, comb. nov. *Eupatorium rosmarinaceum* Cabrera & Vittet, Sellowia 15: 195. 1963.

AYAPANOPSIS OBLONGIFOLIA (Gardn.) R. M. King & H. Robinson, comb. nov. *Bolbostylis oblongifolia* Gardn., Lond. J. Bot. 5: 469. 1846.

BARROSOA CONFLUENTIS (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium confluentis* B. L. Robinson, Contrib. Gray Herb. n.s. 77: 11. 1926.

BARTLETTINA MACROMERIS (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium macromeris* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 24. 1923.

CAMPOVASSOURIA CRUCIATA (Vellozo) R. M. King & H. Robinson, comb. nov. *Chrysocoma cruciata* Vellozo, Fl. Flum. 306. 1825. The Vellozo name has priority for the species commonly known as *Eupatorium bupleurifolium* DC. The Vellozo drawing shows the densely foliate form that is restricted to southern Brasil.

CHROMOLAENA ANGUSTICEPS (Malme) R. M. King & H. Robinson, comb. nov. *Eupatorium angusticeps* Malme, Arkiv Bot. (Stockh.). 24A (6): 25. 1932.

CHROMOLAENA CALDENSIS (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium caldense* B. L. Robinson, Contrib. Gray Herb. n.s. 73: 7. 1924.

CHROMOLAENA COSTATIPES (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium costatipes* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 12. 1923.

CHROMOLAENA DESMOCEPHALA (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium desmocephalum* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 14. 1923.

CHROMOLAENA FERRUGINEA R. M. King & H. Robinson, nom. nov. *Eupatorium ferrugineum* Gardn., Lond. J. Bot. 6: 442. 1847. non Labill.

CHROMOLAENA HYPODICTYA (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium hypodictyon* B. L. Robinson, Proc. Bost. Soc. Nat. Hist. 31: 250. 1904.

CHROMOLAENA MAXIMILIANII (Schrad. ex DC.) R. M. King & H. Robinson, comb. nov. *Eupatorium maximilianii* Schrad. ex DC., Prodr. 5: 143. 1836.

CHROMOLAENA POROPHYLLOIDES (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium porophylloides* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 29. 1923.

CHROMOLAENA RIGIDA (Swartz) R. M. King & H. Robinson, comb. nov. *Eupatorium rigidum* Swartz, Prodr. Veg. Ind. Occ. 111. 1788.

CHROMOLAENA SERRATULOIDES (H.B.K.) R. M. King & H. Robinson, comb. nov. *Eupatorium serratuloides* H.B.K., Nov. Gen. et Sp. 4: 91. ed. folio 1818.

CRITONIA ARACHNOIDEA (Legname) R. M. King & H. Robinson, comb. nov. *Eupatorium arachnoideum* Legname, Lilloa 35: 51. 1975.

CRITONIA MEGAPHYLLA (Baker) R. M. King & H. Robinson, comb. nov. *Eupatorium megaphyllum* Baker in Martius, Fl. Bras. 6 (2): 322. 1876.

CRONQUISTIANTHUS BULLIFERUS (Blake) R. M. King & H. Robinson, comb. nov. *Eupatorium bulliferum* Blake, Rhodora 43: 558. 1941. The name was provided by Blake for *Eupatorium rugosum* H.B.K. not Houtt.

FLEISCHMANNIA ANTIQUORUM (Standl. & Steyerm.) R. M. King & H. Robinson, comb. nov. *Eupatorium antiquorum* Standl. & Steyerm., Publ. Field Mus. Nat. Hist. Chic. Bot. 22: 302. 1940.

FLEISCHMANNIA PASTAZAE (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium pastazae* B. L. Robinson, Biblioth. Bot. 29: 160 Heft. 116. 1937.

FLEISCHMANNIA SAXORUM (Standl. & Steyerm.) R. M. King & H. Robinson, comb. nov. *Eupatorium saxorum* Standl. & Steyerm., Publ. Field Mus. Nat. Hist. Chic. Bot. 23: 189. 1944.

GRAZIELIA MOLLICOMA (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium mollicomum* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 26. 1923.

GUAYANIA CRASSICAULIS (Steyerm.) R. M. King & H. Robinson, comb. nov. *Eupatorium crassicaule* Steyerm., Fieldiana, Bot. 28: 629, No. 3. 1953.

HEBECLINIUM OBTUSISQUAMOSUM (Hieron. ex Sod.) R. M. King & H. Robinson, comb. nov. *Eupatorium obtusisquamosum* Hieron. ex Sod., Bot. Jahrb. 29: 14. 1900.

HETEROCONDYLUS ALATUS (Vellozo) R. M. King & H. Robinson, comb. nov. *Chrysocoma alata* Vellozo, Fl. Flum. 313. 1825. The Vellozo name has priority for the species commonly known as *Eupatorium vautherianum* DC.

KOANOPHYLLON GRANDICEPS (Wright) R. M. King & H. Robinson, comb. nov. *Eupatorium grandiceps* Wright, Anales Acad. Ci. Med. Habana 6: 178. 1869. Sauv. Fl. Cub. 76. 1873.

KOANOPHYLLON GRISEBACHIANUM (Alain) R. M. King & H. Robinson, comb. nov. *Eupatorium grisebachianum* Alain, Candollea 17: 121. 1960. The name was provided by Alain for *Eupatorium incisum* Griseb. not A.Rich.

KOANOPHYLLON QUISQUEYANUM (Alain) R. M. King & H. Robinson, comb. nov. *Eupatorium quisqueyanum* Alain, Moscosoa 1 (1): 48. 1976.

NEOCABRERIA PENNIVENIA (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Symphyopappus pennivenius* B. L. Robinson, Contrib. Gray Herb. n.s. 68: 7. 1923.

PHALACRAEA LONGIPETIOLATA (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Piqueria longipetiolata* B. L. Robinson, Proc. Amer. Acad. 43: 27. 1907.

SPHAEREUPATORIUM SPHAEROCEPHALUM (Sch.Bip. ex Baker) R. M. King & H. Robinson, comb. nov. *Eupatorium sphaerocephalum* Sch. Bip. ex Baker in Martius, Fl. Bras. 6 (2): 317. 1876.

STEVIOPSIS VIGINTISETA (DC.) R. M. King & H. Robinson, comb. nov. *Stevia vigintiseta* DC., Prodr. 5: 123. 1836.

One species transferred to the tribe Inuleae also needs a new combination:

IPHIONA RETOFRACTA (Thunb.) H. Robinson, comb. nov. *Eupatorium retrofractum* Thunb., Prodr. Pl. Cap. 142. 1800.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCVIII.

ADDITIONS TO *BADILLOA* AND *BARTLETTINA* FROM ECUADOR

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Material recently sent on loan by the New York Botanical Garden contains specimens of one previously described species needing a new combination and one species that is undescribed.

BADILLOA ATRESCENS (B.L.Robinson) R. M. King & H. Robinson, comb. nov. *Eupatorium atrescens* B.L.Robinson, Contrib. Gray Herb. n.s. 77: 9. 1926. The species was originally described as a shrub, 8 ft. tall with purple flowers from between San Lucas and Oña in the Province of Loja, Ecuador. When examined many years ago, the species seemed to represent an intergeneric hybrid between *Badilloa* and *Aristeguietia* with the essential key characters of the former. We deferred making a combination without evidence of the existance of an established population. The following specimen provides that evidence. ECUADOR: Azuay-"Oriente" Border: Eastern Cordillera, between Oña and the río Yacuambi. West slope, 8,000-9,500 ft. elev. Vine. Leaves deep green above, pale below. Bracts green suffused with reddish purple. Base of corolla cream; upper part of tube, lobes and style branches dull lavender-purple. Sept. 10-19, 1945. *F. Prieto P-213.*

BARTLETTINA CAMPII R.M.King & H.Robinson, sp. nov.

Plantae scandentes 5 m longae mediocriter ramosae. Caules pallide brunnescentes subhexagonales dense grosse hirsuti. Folia opposita, petiolis 1.5-4.5 cm longis; laminae triangulares plerumque 4-10 cm longae et 3-7 cm latae base valde cordatae margine multo crenato-dentatae apice breviter anguste acuminatae supra ubiquiter pilosae subtus plerumque in nervis prominule reticulatis pilosae ad basem distincte trinervatae. Inflorescentiae late laxe pyramidaliter paniculatae in ramis distalis congestae, ramis ultimis 2-11 mm longis hirsutis. Capitula late campanulata 8-10 mm alta et 6-10 mm lata; squamae involucri ca. 50 distincte subimbricatae valde inaequilongae ca. 4-seriatae ovatae vel lineari-lanceolatae 2-6 mm longae et 0.3-1.3 mm latae late vel anguste acutae margine puberulo-fimbriatae extus puberulae vel glabrae 2-4-costatae; receptacula leniter convexa sparse pilosula. Flores ca. 40 in capitulo; corollae purpureae ca. 5.0-5.5 mm longae extus glabrae, tubis cylindraceis ca. 3 mm longis, faucibus infundibularibus ca. 2 mm longis, lobis triangularibus ca. 0.5 mm longis et base 0.4-0.5 mm latis utrinque laevibus; filamenta in parte superiore ca. 0.5 mm longa, cellulis plerumque

breviter oblongis in parietibus distincte annulate ornatis; thecae antherarum ca. 1.3 mm longae; appendices antherarum ovatae ca. 0.23 mm longae et 0.18 mm latae; rami stylorum vix mamillosi. Achaenia 2.5-3.0 mm longa glabra vel superne perpauce setulifera; carpopodia ca. 0.05 mm alta et 0.25-0.35 mm lata in costis vix procurrentia; setae pappi ca. 40-45 plerumque 4.5-5.0 mm longae apice non latiores, cellulis apicalibus breviter acutis. Grana pollinis in diametro ca. 23 μm.

TYPE: ECUADOR: Santiago-Zamora ("Oriente"): Eastern slopes of the cordillera, valley of the Río Negro, down to the Río Pailas (on the trail to Mendez). 6000-7500 ft. Vine 5 m. Leaves deep green, very nitid above. Pubescence deep purple. Lower bracts purplish, upper dark green. Corolla deep magenta-purple. Style branches salmon-pink. Anthers pale brown. Pappus white. Aug. 20-24, 1945. Collected by Francisco Prieto, *Camp E-4935* (Holotype, NY).

Bartlettina campii is another in the growing number of cordate-leaved members of the genus known from northern South America. The species seems closest to *B. cleefii* K. & R. of northern Colombia, but the latter has more ovate shorter-tipped leaves and a denser inflorescence with smaller heads containing only about 25 flowers.

Bartlettina campii R. M. King & H. Robinson, Holotype, New York Botanical Garden. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

STUDIES IN THE HELIANTHEAE (ASTERACEAE). XXVIII.

ADDITIONS TO *CALEA* AND *ICHTHYOTHERE* FROM BRASIL.

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In the last few years, a number of species have been described from Brasil in the genera *Calea* (Robinson,1979a,b,1980b, Santos, 1980) and *Ichthyothere* (Robinson, 1980a). Nevertheless, recent collections contain material of a further undescribed species in each of these genera.

CALEA BISHOPII H.Robinson, sp. nov.

Plantae herbaceae erectae ad o.5 m altae mediocriter ramosae in caulis foliis et involucris glabrae. Caules atro-brunnescentes teretes subtiliter costati. Folia opposita filiformia 2-3 cm longa et ca. 0.5 mm lata sessilia integra. Inflorescentiae in ramis terminales in pedunculis elongatis unicapitatae. Capitula heterogama; involucra campanulata ca. 8 mm alta et 6-7 mm lata; squamae involucri ca. 10 subimbricatae ca. 3-seriatae inaequales rufo-brunnescentes oblongae 3-7 mm longae et 2.0-2.5 mm lata apice rotundatae margine minute puberulo-fimbriatae extus multo striatae. Flores radii 5-6; corollae flavae glabrae, tubis ca. 2 mm longae, limbis ca. 7 mm longae et 3 mm latae. Flores disci ca. 7-8; corollae sordido-flavae ca. 5 mm longae glabrae, tubis ca. 1.2 mm longis, faucibus anguste campanulatis ca. 2.2 mm longis, lobis oblongo-triangularibus ca. 1.2 mm longis et base 0.8 mm latis; filamenta in parte superiore ca. 0.3 mm longa; thecae ca. 2 mm longae; appendices antherarum ovatae ca. 0.3 mm longae et latae; basi stylorum leniter noduliferi, rami stylorum senecioniformes. Achaenia prismatica ca. 3.3 mm longa base breviter angustiora superne setulifera, setis recte biseriatis; squamae pappi ca. 9 lanceolatae 3.0-3.5 mm longae extus plerumque laeves. Grana pollinis in diametro ca. 33-35 µm.

TYPE: BRASIL: Minas Gerais: 10 km S of Diamantina from road to 8 km W. Elev. 3600-4000 feet. Flowers yellow, rare in pasture. Jan. 18, 1981. *King & Bishop 8551* (Holotype, UB; isotype, US).

The new species seems most closely related to *Calea kirkbridei* H.Robins. also of Minas Gerais, but the latter has broader linear leaves, scabrid peduncles, and heads with more numerous parts, up to 15 involucral bracts, ca. 8 ray flowers and ca. 20 disk flowers (Robinson, 1979a).

Calea heringeri is the correct spelling the species recently described with an extra *"l"* in Phytologia 47 (3): 261. 1980.

ICHTHYOTHERE DAVIDSEI H.Robinson, sp. nov.

Plantae herbaceae erectae ca. 0.8 m altae mediocriter ramosae. Caules sordidovirides subteretes striati pilosi. Folia opposita elliptica plerumque 5-14 cm longa et 1.5-5.0 cm lata base et apice acuminata base subpetioliformia margine integra vel subintegra utrinque plerumque in nervis et marginis pilosa subtus leniter pallidiora glandulo-punctata supra basem valde trinervata, nervis secundariis valde ascendentibus ad marginem subparallelis. Inflorescentiae in ramis terminales in glomerulis pauci-capitatis aggregatae foliatae. Capitula sessilia vel subsessilia 5-8 mm alta et 4-5 mm lata; squamae exteriores femineae ca. 2 in capitulo late ellipticae vel orbiculares 4-5 mm longae et ca. 3 mm latae extus pilosae subtiliter multi-costatae; squamae interiores masculi (paleae) ca. 30 oblongae ca. 3 mm longae et 2 mm latae late bicostatae. Corollae femineae tubiformes ca. 1 mm longae minute 5-lobatae supra medio puberuli, pilis biseriatis glanduliferis et non glanduliferis, glandulis non incrassatis. Corollae masculae albae infundibulares ca. 3 mm longae, faucibus in nervis mediocriter incrassatis, lobis triangularibus ca. 0.6 mm longis et 0.5 mm latis superne glandulo-punctatis; filamenta in parte superiore ca. 0.25 mm longa; thecae ca. 1 mm longae; appendices antherarum ca. 0.15 mm longae et 0.12 mm latae extus pauce glanduliferae. Achaenia feminea obprismatica ca. 4 mm longa subtiliter 4-angulata laevia vel extus pustulata. Grana pollinis in diametro ca. 25 µm.

TYPE: BRASIL: Pará: Municipio conceição do Araguaia. Range of low hills ca. 20 km west of Redenção, near Côrrego São João and Troncamento Santa Teresa. Approx. 8°03'S., 50°10'W. Alt. 350-620 m. Erect herb on open rock outcrop on steep hillside. Florets white. *T.Plowman, G.Davidse, N.A.Rosa, C.S.Rosario & M.R.dos Santos 8511* (Holotype, MG; Isotypes, NY, US). PARATYPE: BRASIL: Pará: Municipio Conceição do Araguaia. Range of low hills ca. 20 km west of Redenção, near Côrrego São João and Troncamento Santa Teresa. Approx. 8°03'S., 50°10'W. alt. 350-620 m. Herb 0.8 m tall in moist crack in exposed rock outcrop on mountain top. Florets white. *Plowman, Davidse et al. 8795* (NY).

The new species seems closest to *Ichthyothere petiolata* H.Robins. from Rondônia in Brasil. The latter, however, is more distinctly petiolate, has serrulate leaf margins, has only one female flower per head, and has only a few large subsessile glands at the apex of the corolla of the female flower. In the new species the corolla of the female flower has many long hairs in the upper half with the cells biseriate. The hairs are either with or without glandular tips, and the gland tip, when present, is not enlarged.

Literature Cited

Robinson, H. 1979a. Studies in the Heliantheae (Asteraceae).

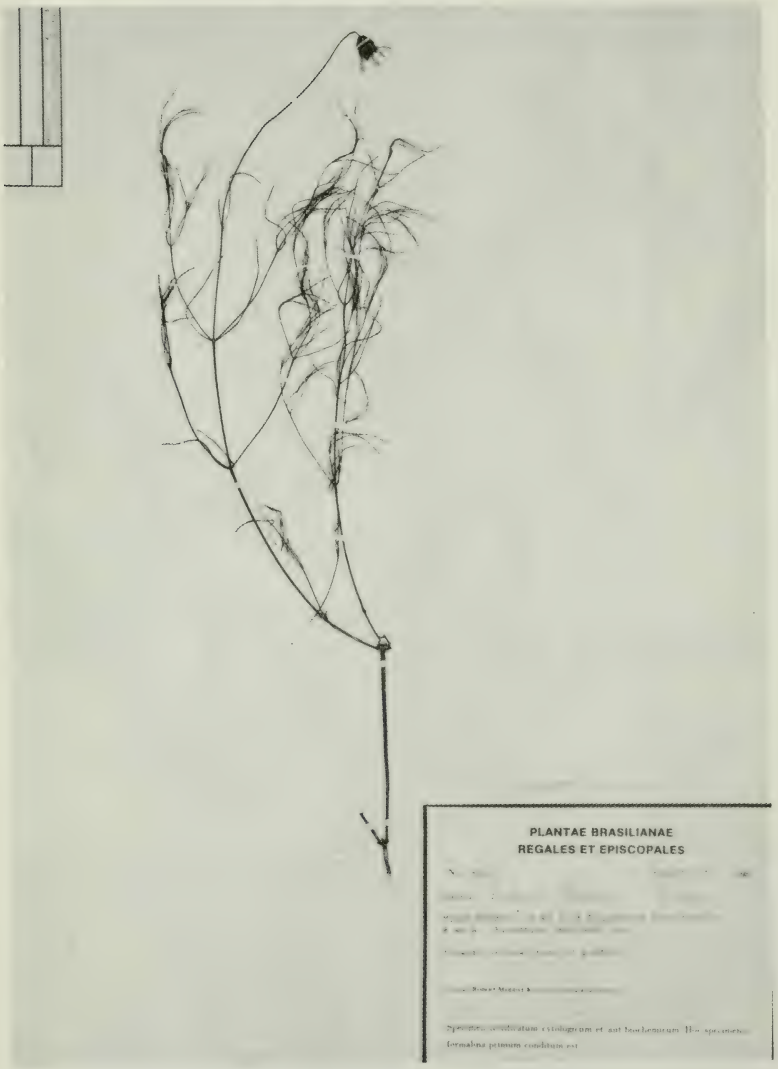
XIX. Four new species of *Calea* from Brasil. Phytologia 44 (4): 270-279.

Robinson, H. 1979b. Studies in the Heliantheae (Asteraceae). XXII. Two new species of *Calea* from Brasil. Phytologia 44 (7): 436-441.

_____. 1980a. Studies in the Heliantheae (Asteraceae). XXVI. New species of *Ichthyothere*. Phytologia 47 (2): 128-134.

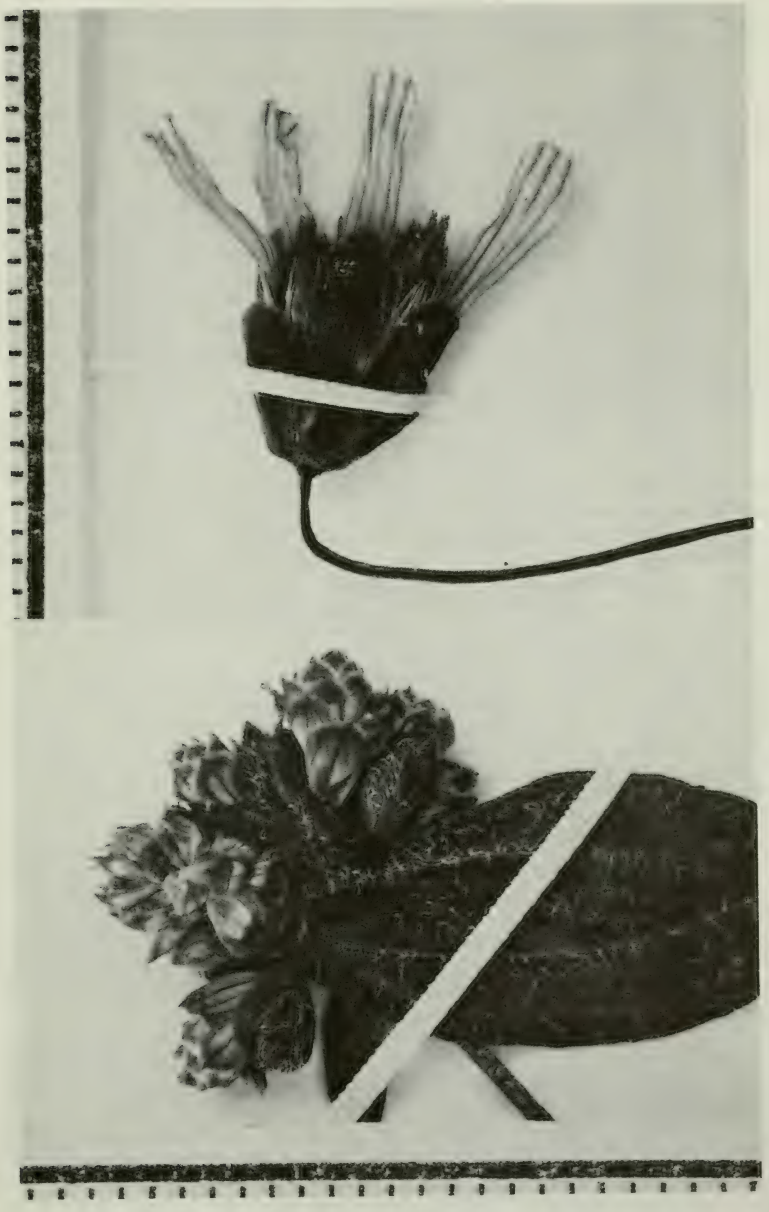
_____. 1980b. Studies in the Heliantheae (Asteraceae). XXVII. A new species of *Calea* from Brasil. Phytologia 47 (3): 261-264.

Santos, Joao Ubiratan Moreira dos 1980. *Calea grazielae* J. U. Santos uma nova especie de *Compositae* para Minas Gerais. Bradea 3 (16): 119-122.



Calea bishopii H. Robinson, Holotype, Herbário Universidade de Brasília. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Ichthyothere davidsei H. Robinson, Isotype, United States National Herbarium.



Enlargements of heads. Top: *Calea bishopii*. Bottom: *Ichthyothere davidsei*.

LOASACEAE OF THE CHIHUAHUAN DESERT REGION

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The Chihuahuan Desert (CD) has been known to contain several species of Loasaceae that appear to be pivotal to understanding relationships among their near relatives from regions to the north and west. Previously these CD species have been represented only by scanty specimens, insufficient in detail to be useful in systematic studies. The project to produce a flora of the CD (Chihuahuan Desert Flora, M.C. Johnston and J. Henrickson, in preparation) has produced such excellent and critical collections of Loasaceae that we have not only been able to write a sound treatment of the family for the flora but also can now extend the earlier work on Eucnide (Thompson and Ernst, 1967) and clarify relationships within two taxonomically difficult species groups of Mentzelia; sect. Mentzelia and sect. Bartonia. Chromosome numbers are reported for 37 populations of 11 species, of which seven species were previously unknown cytologically. Distributions of CD endemics are given in detail and one new species of Eucnide is described. Voucher specimens are filed in the herbaria of the University of Texas (TEX), Sul Ross State University (SRSC), and the University of California, Los Angeles (LA). Chromosome counts have been made from aceto-carmine squashes of microsporocytes in meiosis. We are grateful to Marshall Johnston, James Henrickson, Jim Weedin, and Donald Pinkava for the opportunity to study their collections of Loasaceae from the Chihuahuan Desert Region (CDR).

EUCNIDE:- The most recent reviews of this genus (Waterfall, 1959; Thompson and Ernst, 1967) had no specimens of Eucnide from Durango and very little material from western Coahuila, so both treatments failed to understand and recognize E. floribunda S. Watson, placing it as a synonym of E. lobata (Hook.) A. Gray. Recent collections include a new species of Eucnide from Durango and provide abundant material of E. floribunda so that it can be recognized as a distinct endemic of the CD.

EUCNIDE DURANGENSIS Thompson and Powell

Herbae perennes. Laminae foliorum 4-7 cm longae late ovatae vel suborbiculares cordatae breve lobatae dense pubescentes margine dentatae. Inflorescentiae pauci- vel multiflorae;

corolla alba lobis effusis 12-16 mm longis; antherae excerae aureae conspicuae, stigma 1-2 mm longa. Fructus hemisphaericus vel oblongus 8-12 mm longus, pedicelli per anthesis ad 2 cm longi demum ad 5 cm longi.

Plants herbaceous perennials, up to 0.7 m tall and 1 m across, pubescent with simple, smooth, needle-like hairs up to 2 mm long and with shorter, reflexly barbed hairs up to 1 mm long; leaf blades rounded to broadly ovate, the largest 5-7 cm in diameter, cordate at base, irregularly and shallowly lobed, the petioles about as long as the blades; calyx lobes lanceolate, 5-7 mm long; petals white, yellow at base, ovate, 16-18 mm long, 10 mm wide, fused to the very short filament tube, the petals spreading at anthesis; stamens about 50, golden yellow, the filaments 12-14 mm long, all of those in a flower about the same length, the anthers about 1 mm long; style and stigma 11-13 mm long, the stigma up to 2 mm long; capsule ovate-oblong, 7-10 mm long, about 4-5 mm wide, pedicels up to 2 cm long in flower and elongating to be twice as long in fruit; seeds oblong, about 0.5 mm long, longitudinally ribbed; chromosome number n=21.

Holotype: James Henrickson 12405, MEXICO. Durango, ca. 14 air mi WSW of Torreón, 2 mi W of Hwy 40, in lower canyon on open vertical limestone cliff, 3800 ft., on road to Microondas Est. Sapioris. Near Lat. 25° 18' N, Long. 103° 43' W. 14 Aug 1973 (TEX, isotype LA).

Additional collections examined: MEXICO. DURANGO. 12 mi S of Rodeo in igneous roadcut on steep grade of Highway 45, 15 Aug 1967, Sikes and Babcock 366 (TEX); 14.7 mi S of Rodeo, McGill, Brown, Pinkava 9343 (ASU); Estación Microondas "Sapioris" ca. 30 km SW of Gomez Palacio on highway towards Durango. Lat. 25° 24' 30" N; Long. 103° 43' W, elevation 1400-1500 m, 25 Mar 1973, Johnston, Wendt, Chiang 10417. COAHUILA. ca. 27 (air) mi SE of Torreón, 9.6 (road) miles SW of La Rosita, Sierra de Himilco, 5700 ft, near Lat. 25° 12' N; Long. 103° 16' W, Henrickson 13223b (LA, TEX).

Eucnide durangensis is known from elevations of 1200 to 1700 m, growing on limestone cliffs or igneus roadcuts with Larrea, Fouquieria splendens, Agave lechequilla and A. falcata. It flowers in March, August and September, apparently whenever rains are favorable.

Eucnide durangensis is most similar to E. lobata and E. floribunda but is distinct in having the petals white and the base of the petals and the stamens, thus the center of the flower, golden yellow. The bases of the petals are narrow and thus do not overlap. In E. lobata and E. floribunda the entire corolla and androecium are golden yellow and the petals are broad and overlapping at the base. Eucnide floribunda is distinctive in this group by its nearly entire, sparcely pubescent leaves and

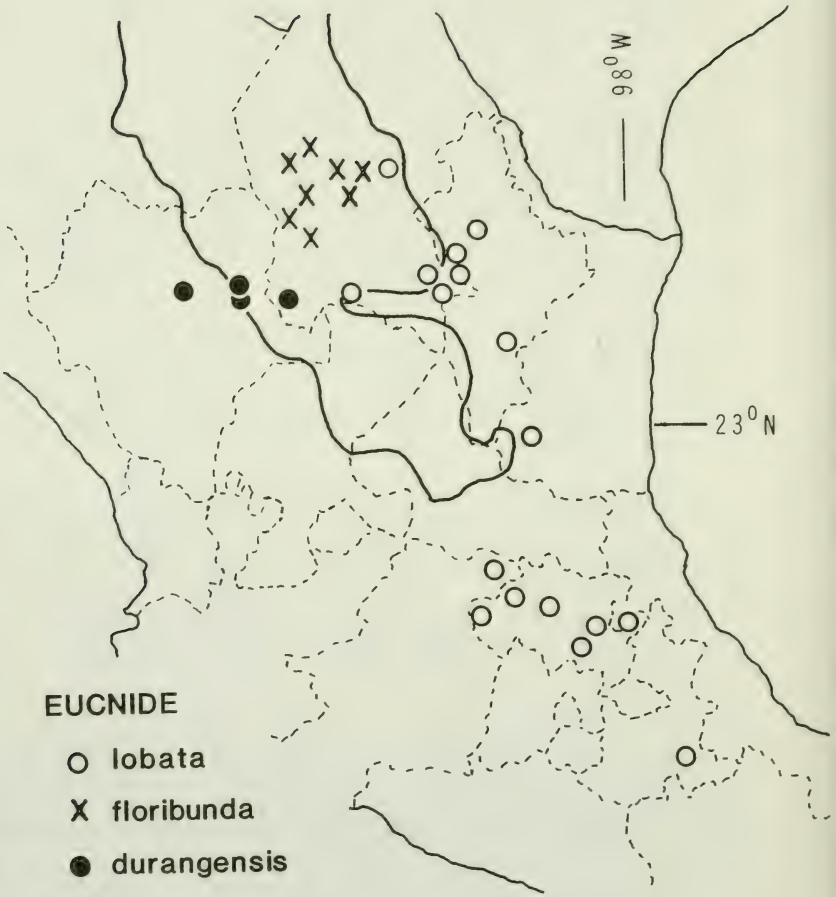

Figure 1. Distribution of Eucnide lobata, E. floribunda, and E. durangensis. The solid line showing the approximate limit of the Chihuahuan Desert is after M.C. Johnston 1977.

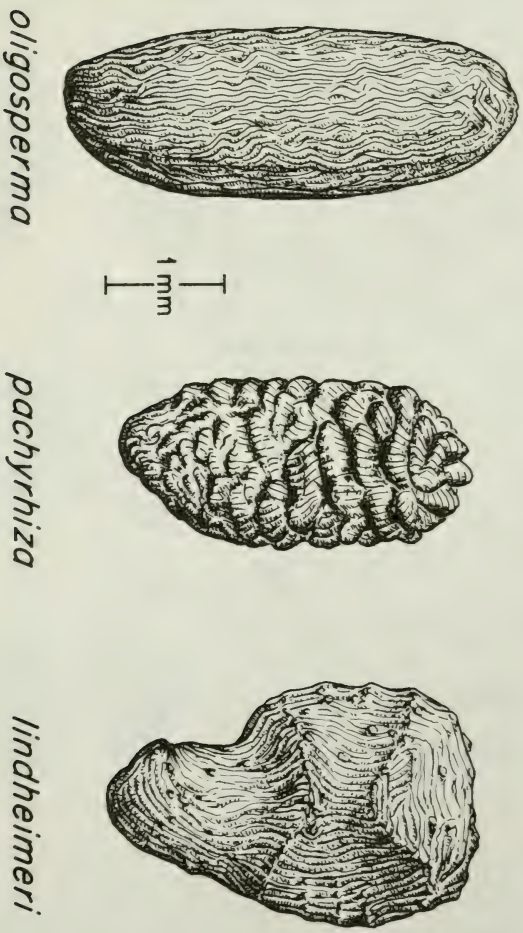

Figure 2. Drawings of the seeds of Menzelia oligosperma, M. pachyrhiza, and M. lindheimeri.

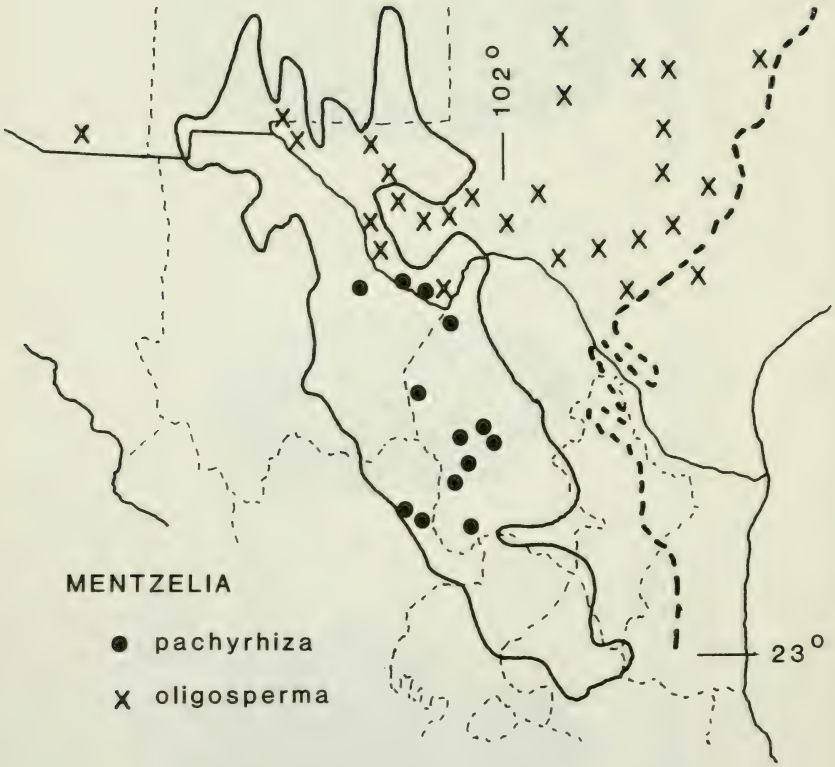

Figure 3. Distribution of Mentzelia pachyrhiza and the southern portion of the distribution of M. oligosperma.

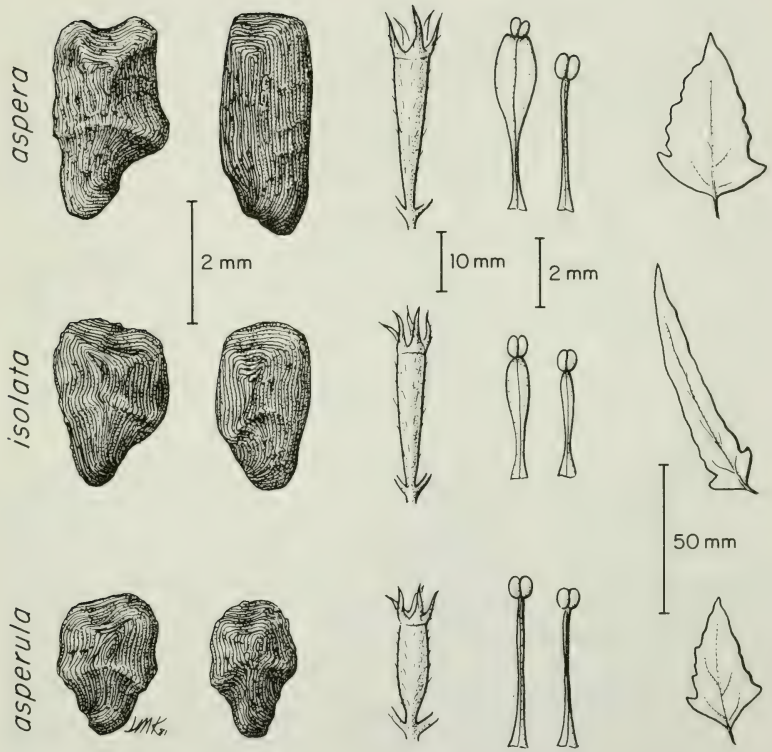

Figure 4. Morphological features of Mentzelia aspera, M. isolata, and M. asperula. Left to right the drawings are: uppermost and lowermost seed in capsule; mature capsule; outer and next inner stames; cauline leaves.

Figure 5. Distribution of Mentzelia asperula, M. isolata, and the northern portion of the distribution of M. aspera.

long (3 mm) stigma. In both E. lobata and E. durangensis the leaves are densely pubescent and shallowly lobed, and the lobes are coarsely dentate. Recent collections, particularly those of Pinkava from the Cuatro Ciénegas area, confirm the morphological and geographical distinctness of E. floribunda and confirm the wisdom of Watson who considered it to resemble, but to be distinct from, E. lobata.

Eucnide durangensis and E. floribunda are species of the CD while the closely related E. lobata occurs on the eastern boundary of the desert and extends southward along the eastern slope of the Sierra Madre Occidental from Monclova, Coahuila to Puebla (fig. 1). These three closely related species are allopatric, but the ranges of E. floribunda and E. lobata converge in the area between Monclova and Cuatro Cienegas. Collections in this region should be critical to the question of the genetic distinctiveness of these two species.

Eucnide floribunda S. Wats. was described from the collection Edward Palmer 832 and the locality given as "San Lorenzo de Laguna, 75 miles southwest of Parras." The direction given is incorrect, for McVaugh (1956) has shown that Palmer traveled northwest, not southwest, out of Parras and reached as far north as Acatita (Lat. 26° 30' N). Modern collections place the southern limit of E. floribunda in this area and it would have been here that Palmer collected his specimen.

We have grown one individual of E. durangensis (Thompson 77003) from seeds taken from Johnston et al. 10417. Numerous microsporocytes of this plant were observed to have 21 pairs of chromosomes. This plant was crossed with E. lobata as follows: lobata (T 3298) original seed from Waterfall 1532 (F) Monterrey female X durangensis (T 77003) male. Only one F_1 individual was grown to maturity. This plant (T 78002) was intermediate with pale cream corollas most similar to the pollen parent and very different from the golden yellow corollas of the seed parent. This hybrid grew vigorously but set no seeds when selfed nor when backcrossed with lobata pollen. Chromosome pairing could not be analyzed in detail because the chromosomes were "sticky" but pairing was not regular and univalents were observed in many cells. Less than 1% of the pollen of this hybrid stained with cotton-blue in lacto-phenol and there was much micropollen. We interpret the sterility of this F_1 hybrid to support the specific distinctness of E. durangensis and E. lobata.

MENTZELIA sect. MENTZELIA: Mentzelia pachyrhiza I. M. Johnston is an endemic of the CD, morphologically similar to M. oligosperma Sims to the north and M. grisebachii U. and G. of Argentina. These three species are distinct from the other species of the section by having woody, cylindrical, sessile capsules with only 2-3 seeds. The shape and surface texture of the seeds of these three species also separate them from the other

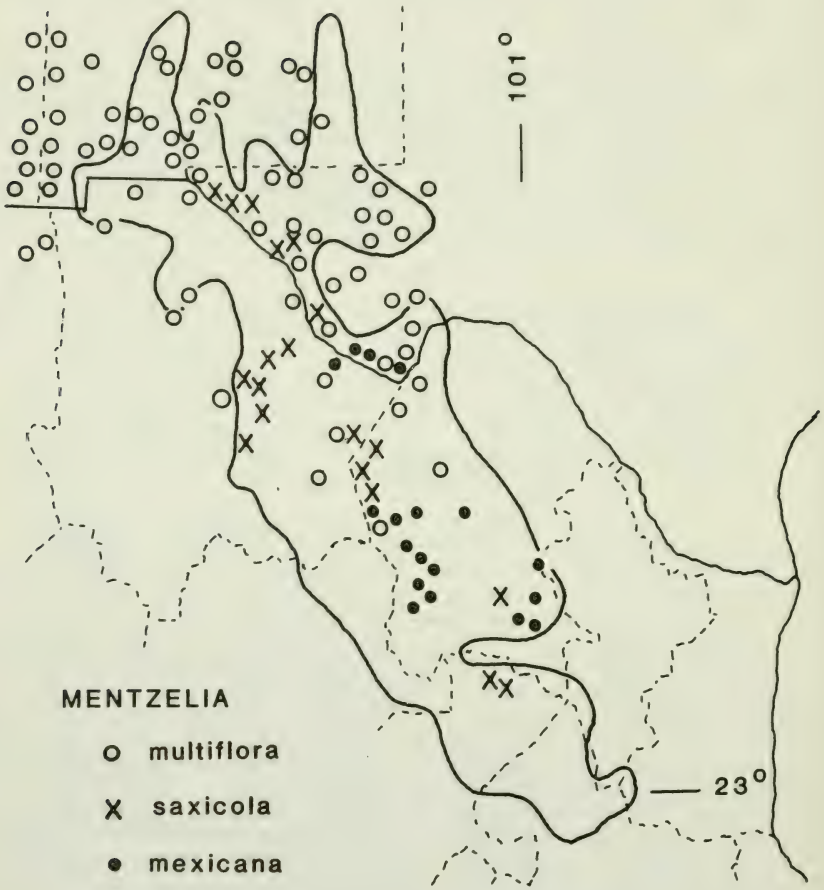

Figure 6. Distribution of Mentzelia saxicola and M. mexicana and the southeastern portion of the distribution of M. multiflora.

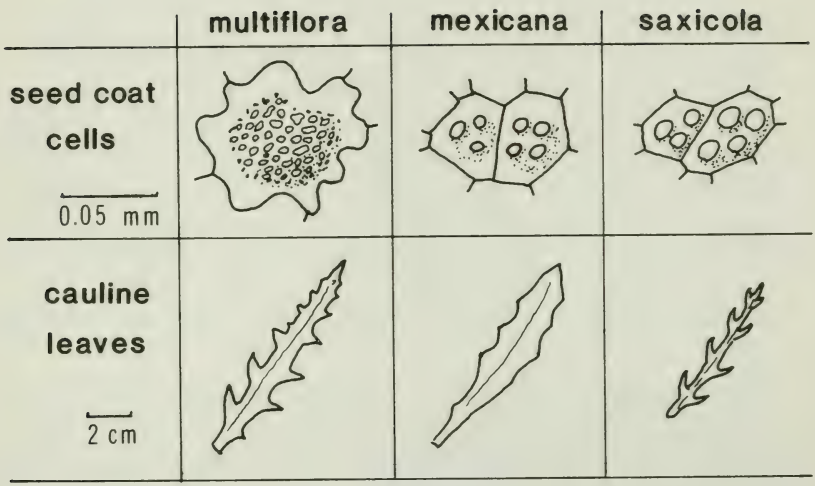

Figure 7. The morphological differences between Mentzelia multiflora, M. mexicana, and M. saxicola. The drawings of cells of the seed coats are tracings from SEM photographs made at 480X.

species of the section. Most of the species of sect. Mentzelia have seeds very similar to those of M. lindheimeri while seeds of M. oligosperma are unique in the genus in having parallel sides and lacking the prominent papillae. The seeds of M. pachyrhiza and M. grisebachii are intermediate between M. oligosperma and M. lindheimeri in shape and surface but are distinctive in having prominant, transverse folds (fig. 2). The thick roots of M. pachyrhiza, emphasized in the original description, are not a distinguishing characteristic, for such roots are present in most, probably all, of the perennial species of this section.

Mentzelia oligosperma, M. pachyrhiza, and M. grisebachii are all n=11, the only known occurrence of this chromosome number in sect. Mentzelia. The chromosome number of M. oligosperma was reported as n=11 (Thompson and Ernst, 1963) and we now report these additional counts; all n=11: TEXAS. Bexar Co.: Alamo Heights, Weedin 864 (SRSC): Brewster Co.: Pine Canyon, Big Bend Nat'l. Park, Powell, Powell, Weedin, Campbell 3233 (SRSC); Alpine, Weedin 907 (SRSC); Glass Mt., Powell 3329 (SRSC). Culberson Co.: Panther Canyon, Apache Mts., Powell 3376 (SRSC). Terrell Co.: 44 mi S of Sheffield, Powell 2762 (SRSC). A specimen of M. grisebachii (Turner 9208, ARGENTINA. Prov. Catamarca, TEX) has been annotated by John Bacon as having n=11. We now report the first counts of M. pachyrhiza, all n=11: TEXAS. Brester Co.: near Lajitas, Powell 2393 (SRSC); Big Bend Nat'l. Park near west entrance, Thompson 3727 (LA). Presidio Co.: 13 mi S of Redford, Powell, Powell, Weedin 2869 (SRSC).

Mentzelia oligosperma and M. pachyrhiza occur in different geographic areas as shown by the map in fig. 3 and where their ranges come together they occur in different habitats at different elevations. Mentzelia oligosperma grows with Larrea at only a few stations, as in Terrell Co., Texas, 6.7 mi E of Sanderson, Raven and Gregory 19201 (LA), but in west Texas and southwest New Mexico it occurs in juniper woodland, above the Larrea zone. In the Big Bend region of West Texas, where M. oligosperma and M. pachyrhiza occur in the same geographic region, the two species are separated in elevation with only M. pachyrhiza occurring with Larrea, usually below 1100 m and well below the juniper zone. Mentzelia pachyrhiza extends south in the CD to Lat. 25° N, growing at elevations between 775 and 1300 m with Larrea and Fouquieria.

In addition to the geographic, habitat, and seed differences between M. oligosperma and M. pachyrhiza the two species are different in petiole length and flower size. The leaves of M. oligosperma are sessile whereas those of M. pachyrhiza have petioles about 5 mm long. Flower size can be conveniently represented by one dimension, length of the outer filaments. In M. oligosperma flower size is uniform throughout its range with outer filaments 8-9.5 mm long. In M. pachyrhiza there is a gradient in flower size, with the smallest flowers (outer filaments 6-7 mm long) in the north and the largest flowers

(outer filaments 8-9 mm long) in the south. Thus in the region of overlap, M. oligosperma and M. pachyrhiza differ in flower size, with M. oligosperma having the larger flowers.

We have seen very little material of the South American M. grisebachii but it is in all respects very similar to M. pachyrhiza. In addition to the morphological similarities the two species are both associates of Larrea divaricata in desert habitats and the two species appear to add another example to the biogeographic pattern exemplified by Larrea divaricata, Mentzelia albescens, etc. (Raven, 1963).

Whereas most species of Mentzelia sect. Mentzelia are herbaceous perennials there are three summer annual species in the section, one of which, M. asperula Wooton and Standley occurs in and around the CD region. Because its two close relatives, M. aspera L. and M. isolata Gentry have been confused with M. asperula we have studied all three species to determine the status of the CD region plants. Mentzelia aspera is a widespread tropical weed and M. isolata occurs in the mountains between the CD and the Sonoran Desert. The three species occur together in only one geographic area, southeastern Arizona, where their sympatry has led to taxonomic confusion but provides an opportunity to determine the distinctiveness of the three species. All three species have small flowers, the petals 7-9 mm long and the longest filaments 5-6 mm long. We have grown collections of each species and find all self-pollinating and self-compatible.

The morphological differences between M. asperula, M. aspera, and M. isolata are in the leaves, outer filaments, capsules and seeds. The differences are shown in fig. 4, to which comments on the relationship between seed shape and position in the capsule and the number of seeds per capsule must be added. In M. asperula all of the seeds in a capsule are similar in shape to each other and to the seeds of most species of sect. Mentzelia (except M. oligosperma, M. pachyrhiza, and M. grisebachii). In M. aspera, on the other hand, the uppermost and lowermost seeds in a capsule differ in shape as shown in fig. 4. The shape of the lowermost seed appears to be determined by its confinement in the very narrow, somewhat woody base of the capsule. This condition in M. isolata is intermediate between M. asperula and M. aspera in that the lowermost seed is only slightly different from the uppermost and the capsule base is more rounded and less woody than in M. aspera. The seeds from the upper portion of the capsule of M. isolata are indistinguishable in shape from the seeds of M. asperula. In M. asperula and M. isolata there are 8-12 seeds per capsule whereas in M. aspera there are only 5-6 seeds per capsule. The lowermost seeds in the woody basal portion of the capsule of M. aspera are similar to the seeds of M. oligosperma where there are only 2-3 seeds in an entirely woody capsule. Thus the unusual seeds and capsules of M. oligosperma are connected by a series

with the general seed and capsule state characteristic of most species in sect. Mentzelia.

The geographic distributions of M. asperula and M. isolata and the northern portion of the range of M. aspera are shown in fig. 5. The northern station for M. aspera is in the Nogales area of southeastern Arizona where it occurs in moist sites at the lower elevations. We have determined the chromosome number of M. aspera as n=10 from material collected in ECUADOR, Galápagos Islands, Academy Bay, Isla Santa Cruz, Wiggins 18336 (LA, CAS).

Mentzelia isolata Gentry was described from a single collection, MEXICO, Sierra Surotato, Sinaloa, Gentry 6577 and has not been studied since the original description. It is now apparent that this species should include the narrow-leaved annuals in southeastern Arizona, which have previously been identified as either M. aspera or M. asperula and have caused a confusion of those two very distinct species. Mentzelia isolata occurs only in the mountains south of the Cochise filter barrier (Morafka, 1977) between the Sonoran and Chihuahuan deserts. We have not had the opportunity to observe M. isolata and M. aspera where they occur at the same collection localities such as at Patagonia, Arizona. Mentzelia isolata usually occurs below 1500 m, often with oaks but usually below junipers and pines. We have determined the chromosome number of M. isolata as n=10: ARIZONA, Patagonia, garden voucher specimen Thompson 3646 (LA) grown from seeds of a collection T. Zavortink s.n., 21 Sep 1970 (LA).

Mentzelia asperula usually occurs above 1300 m, usually with junipers and pines. In southeastern Arizona, where the distributions of M. asperula and M. isolata overlap the two species are separated by elevation with M. asperula above M. isolata. We have determined the chromosome numbers of plants from three populations of M. asperula. Two populations in the northwest portion of its range are both n=20: ARIZONA. Cochise Co.: N end of Mule Pass Tunnel, just N of Bisbee, Thompson 3724 (LA); and TEXAS. Jeff Davis Co: 13 mi N of Alpine, Thompson 3724 (LA). The third population of M. asperula, in the south-central portion of the range is n=10: ZACATECAS. 24 mi NE of Concepción del Oro, garden voucher Thompson 3738 (LA) grown from seed collected by James Henrickson, 9 Dec 1975, a recollection of Henrickson 6265 (LA, TEX). We are unable to detect morphological differences between our known diploid and tetrapoid voucher specimens that will separate the other collection into two groups. Where the ranges of the very similar species M. asperula and M. isolata overlap they have different chromosome numbers.

Mentzelia lindheimeri Urban and Gilg is an herbaceous perennial with an enlarged root and elongated stems that are often scandent in shrubs when they may be up to 2 m long. The flowers are medium in size for sect. Mentzelia with the petals 9-12 mm long. The longest stamens are 9-10 mm long and the stigma

is only 1 mm above the anthers. The flowers open soon after sunrise and close at midday.

We have determined chromosome numbers of n=10 in two populations of M. lindheimeri: TEXAS. Presidio Co.: plants grown from tubers collected on Chianti Peak, 6000-6500 ft, Butterwick and Lott 3914 (LA, SRSC); Jeff Davis Co.: plants grown from seed collected along Limpia Creek, just N of Fort Davis, 4900 ft, Thompson 3722 (LA, SRSC). The Fort Davis plants were self-compatible and self-pollinating, setting seed when left undisturbed in an insect-free screenhouse. In the natural population the plants were growing in a small flood-plain of Limpia Creek in very deep, sandy loam and in riparian vegetation with Salix, Populus, Juglans and often scandent in Baccharis glutinosa. No individuals of M. lindheimeri were found on adjacent dry slopes with Juniperus, Yucca, and Opuntia but the annual, M. asperula was encountered in this habitat. Mentzelia lindheimeri is abundant in eastern Texas, where its preferred habitat is more widespread, and ranges to west Texas and Cochise Co., southeastern Arizona. In the west it usually occurs at elevations above 1500 m.

Mentzelia hispida Willd. is an herbaceous perennial with an enlarged root and the largest flowers in sect. Mentzelia, with petals often 30 mm long. The stamens are in two distinct series, the outer 10 up to 25 mm long and the cluster of inner stamens about 10 mm long. The style is long, positioning the stigma above the longest stamens. We have determined the chromosome number as n=10 from one collection: MEXICO, HIDALGO, 5 mi NE of Buena Vista on road from Pachuca to Mezquititlan, 1350 m, garden voucher specimen Thompson 3389 (LA) grown from seed of the collection Breedlove 7204 (LA). The garden plants of this collection were self-incompatible and the flower opened soon after sunrise and closed about midday. These garden plants were visited and pollinated by a bumble bee (Bombus sp.). Mentzelia hispida ranges more or less continuously from southern Chihuahua to Oaxaca, usually above 1200 m elevation. It has been collected at outlying stations in northeastern Sonora (White 4654, ARIZ) and in southwestern New Mexico (Corodado (sic) Nat'l. Forest, north of Animas, Goodding s.n., 18 Sep 1937, ARIZ). The locality as given is probably in error because Colorado Nat'l. Forest is south of Animas.

MENTZELIA section BARTONIA:-- This section is taxonomically the most difficult group in Mentzelia. All of its 40 species occur in the United States, a few of them range into Mexico and one, M. albescens (Gill. and Arn.) Griseb. is amphitropical, occurring also in Argentina and Chile. Two species of this section, M. mexicana Thomps. and Zavor. and M. saxicola Thomps. and Zavor., are endemic to the CD. They have been known from relatively few collections and these have been confused with the widespread M. multiflora (Nutt.) Gray. New collections have added greatly to our understanding of these three species in the CDR.

Mentzelia multiflora is geographically and ecologically the most widespread species and it is also morphologically the most variable. It ranges from Wyoming in the north and the northern Sonoran Desert in the west into the CDR as far south as Lat. 27o in Coahuila near the Chihuahuan border. A chromosome number of n=9 has been determined for many populations, some reported from the northern portion of the range (Thompson, 1963), and now n=9 is reported from the following populations in the southeastern range of the species: TEXAS. El Paso Co.: Hueco Tanks State Park, Powell and Powell 3001 (SRSC). Presidio Co.: upper Pinto Canyon, Weedin 310 (SRSC); near Presidio, Thompson 3745 (LA). Hudsbeth Co.: Dell City, Powell, Powell and Weedin 2847 (SRSC). Jeff Davis Co.: jct. Hwys. 118N and 1837, Weedin 333 (SRSC). Ward Co.: Pecos, Thompson 2088 (LA). CHIHUAHUA. El Sueco, Thompson 3732 (LA).

In the CDR, M. multiflora occurs above 1400 m with only occasional stations at lower elevations. Along the Rio Grande M. multiflora ranges downriver as far as Presidio, elevation 800 m, where it may be a waif. Thus M. multiflora occurs in the northern and higher margins of the CD, but in the central portion of the desert it is replaced geographically by the gypsum endemics, M. mexicana and M. saxicola (fig. 6).

Mentzelia saxicola occurs at elevations between 800 and 1900 m and M. mexicana between 600 and 1300 m. The co-occurrence of these two species with M. multiflora is less than suggested by general geographical and elevational ranges for in specific areas M. saxicola and M. mexicana occur below M. multiflora, although the elevation of the turnover point varies with latitude, rainfall, and exposure. Mentzelia saxicola and M. multiflora occasionally occur as adjacent populations but we know of no such occurrence of M. multiflora with M. mexicana.

Some of the differences between these three CDR species of Mentzelia sect. Bartonia are presented in fig. 7. Observations of individual cells of the seed coats of these species made at a magnification of 200X with a compound light microscope show M. saxicola and M. mexicana to be very similar to each other but very different from M. multiflora. These cells in M. multiflora are twice as large as in M. saxicola and M. mexicana. The common (radial) walls of adjacent cells are sinuous in M. multiflora and the raised, central portion of the outer surface wall has numerous small, irregularly shaped papillae. In M. mexicana and M. saxicola the common walls of adjacent cells are straight and there are only 3-5 large papillae. When viewed with a hand lens (15X) the seeds of M. multiflora appear rough or papillose while those of M. mexicana and M. saxicola appear relatively smooth. The branching pattern differences between these three species are very conspicuous in plants flowering for the first time, that is, having just bolted from the primary rosette. Mentzelia multiflora is erect, usually over 0.5 m tall and often reaching a height of

1.0 m and branches only in the upper half of the main axis. Both M. saxicola and M. mexicana are rounded in outline, usually less than 0.3 m tall and branch from the base of the main axis. In subsequent years of flowering in these short-lived, herbaceous perennials the branching patterns are less distinctive, varying with the number of secondary inflorescences and the general vigor of the plant. Some individuals of M. multiflora when flowering for the second time may produce several small, lateral rosettes and from them bolt short flowering branches and thus be low and compact and similar to M. saxicola and M. mexicana. The capsules of M. multiflora are much larger than those of M. mexicana and M. saxicola. This size difference can be expressed by simple measures of capsule length which are: multiflora 15-25 mm, mexicana 5-13 mm, and saxicola 7-12 mm.

Mentzelia saxicola has a chromosome number of n=10 (Thompson and Zavortink, 1968; Powell and Powell, 1977). We now report n=10 for two additional populations: CHIHUAHUA. Coyame, Thompson 3730 (LA). ZACATECAS. Concepción del Oro, grown from seed collected by James Henrickson, voucher Thompson 3738 (LA). The population from Zacatecas is the southermost known for this species. We have grown plants of M. saxicola from seed collected near Van Horn, Texas, Thompson 3545 and from Zacatecas, Thompson 3738 and all individuals were self-incompatible. Several attempts to cross these plants with other n=10 species of sect. Bartonia gave no viable seeds. Attempts to cross M. saxicola (n=10) with M. multiflora (n=9) were also unsuccessful although we have reported natural F_1 hybrids with 2n=19 (Thompson and Zavortink, 1968).

We report the first chromosome counts of M. mexicana as n=9 and n=10. In the northern range of the species the six populations counted are all n=9: TEXAS. Brewster Co.: 10 mi N of Terlingua, Thompson 3725 (LA); N of Castolon, Big Bend Nat'l. Park, Thompson 3548 (LA); Powell and Powell 3126 (SRSC); near Terlingua, Powell 2383 (SRSC); Powell and Powell 3027 (SRSC); Boquillas Canyon, Big Bend Nat'l. Park, Thompson 3547 (LA). Presidio Co.: Big Hill, between Redford and Lajitas, Powell, Powell and Weedin 2973 (SRSC). Three populations of M. mexicana from the southern range of the species in Mexico are all n=10: COAHUILA. W of Cuatro Ciénegas, Powell and Tomb 2615 (SRSC), also plants grown from seed of this collection, voucher Thompson 3711 (LA): Cuatro Ciénegas, Powell and Turner 2294 (SRSC); Las Delicias, Powell and Turner 2704 (SRSC). We are unable to find any morphological character that will distinguish the n=9 and n=10 populations of M. mexicana. Our first counts of M. mexicana were from the Big Bend, n=9 populations and we were so surprised when the first count of plants from Coahuila were n=10 (Powell and Tomb 2615) that seeds were taken from this voucher specimen, plants grown at UCLA and veritifed as n=10 (voucher Thompson 3711). Both the n=9 and n=10 plants of M. mexicana are self-incompatible. We have not attempted crosses using the mexicana n=10 plants but plants of mexicana n=9 (Thompson 3548) from the Big Bend Region

were crossed with three populations of M. multiflora (all n=9): Thompson 3404 Congress, Arizona; Thompson 3557 Ghost Ranch, N.W.: Thompson 3546 Ft. Davis, Texas. Seed set in the cross mexicana 3548 X multiflora 3557 and reciprocal was low and none of the seed germinated. In the crosses mexicana 3548 female X multiflora 3404 male and mexicana 3548 X multiflora 3546 and reciprocal the seed set was high and germination was above 50%. Fifteen F_1 individuals were grown, they were vigorous but produced no pollen and set no seed. Thus M. mexicana appears to be both genetically and morphologically distinct from its nearest relative, M. multiflora.

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NOTEWORTHY GRASSES FROM MEXICO IX.

Alan A. Beetle APDO POSTAL 284
Hermosillo, Sonora, Mexico

These are results from continuing studies sponsored by the Comision Tecnico Consultiva para la Determinacion Regional de los Coeficientes de Agostadero, fundada en 1966, y es dependencia de la Secretaria de Agricultura y Recursos Hidraulicos.

For previous papers see Phytologia 27:1974; 28:1974; 30: 1975; 35:1977; 38:1978; 47:1981, and 48:1981.

Agropyron vaillantianum (Wulf. & Schreb.)Trautv.

The Agropyron caninum - A. trachycaulum complex is mostly cespitose. The A. repens - A. smithii complex is generally rhizomatous. There is also a group of weakly rhizomatous plants with intermediate spike and floret characteristics which is undoubtedly of hybrid origin and which has caused a great deal of taxonomic difficulty and uncertainty.

Plants from the central highland of Mexico have been reported consistently since Urbina (cf. Urbina, 1897, Cat. de Plantas Mexicanus. Museo Nacional. Gramineae 376 - 415.) as A. repens but nevertheless appear to represent the above mentioned intermediates which have been reported from Europe, Canada, the U.S.A. and Argentina. The Mexican distribution includes Chihuahua, Durango, Oaxaca (Beetle M - 4761), Puebla, Mexico (Reeder & Reeder 3059), Tlaxcala, and Hidalgo (Rzedowski 21399 and 22435).

The Mexican plants which have slender rhizomes, narrow leaves and large glumes are apparently native, and have a close superficial resemblance to A. pseudorepens. Pohl (1962. Agropyron hybrids and the status of Agropyron pseudorepens. Rhodora 64:143 - 147) has shown that "the type of A. pseudorepens is therefore a probable male-sterile hybrid of A. trachycaulum and A. smithii. Both species are known from Nebraska. The name A. pseudorepens, if used, should be applied only to such hybrids." The Mexican plants are completely fertile producing both pollen and mature caryopses.

While looking for possible names Elymus mexicanus Cav. was encountered in Fournier, Mex. Pl., 1886, but this was described from plants cultivated "en el Real Jardin botanico" at Madrid, Spain. Kunth (Enum. Pl. 1:451. 1829) placed this name in the synonymy of the Old World E. sabulosus Bieb. Bowden (1957, Cytotaxonomy of section Psammelymus of the genus Elymus. Canadian Journal of Botany 35:951 - 993) agrees that E. mexicanus is "not a native of Mexico."

Melderis (1950. The short-awned species of the genus Roegneria of Scotland, Iceland and Greenland. Svensk Botanisk Tidskrift Bd 44, H.1. 132 - 166; cf page 141) says "the first American authors to regard these short-awned plants with dense spikes as a distinct species were Scribner and Smith. They described it in 1897 as A. pseudorepens; the holotype was collected by Rydberg in Nebraska, Kearney, n. 2018. I have seen a spikelet of a topotype collected by Shear (n. 272). It agrees so well with the Scottish A. donianum that it must be considered conspecific with it. As the epithet donianum is earlier than pseudorepens, the correct name of the combined species under Roegneria will be R. doniana (F.B.-White)Meld." While Agropyron donianum F. Buch.-White is accepted by Hulten (1958. The Amphi-atlantic plants and their phytogeographical connections. Kungliga Vetenskapsakademiens Handlingar. Ejarde Serien. Band 7. Nr. 1. Stockholm pp 1 - 340.), and Agropyron pseudorepens is given as a synonym, no mention is made of Mexico as part of its distribution.

There is another name, Agropyron vaillantianum, which was described from Europe. This name was used for plants in Massachusetts (Bear et al. 1947. Rhodora 49:265) and also for Argentina (Parodi, 1940, Rev. del Museo de La Plata (n.s.) III. Sect. Bot. 1 - 63.). Even though a European name is chosen it does not follow that the plant is introduced in Mexico. Other species such as Phleum alpinum, Juncus acutus, and others, have essentially the same distribution pattern including Europe, North America (incl. Mexico), and Argentina. This name being used for the first time in relation to the Mexican flora and a partial synonymy follow:

Agropyron vaillantianum (Wulf. & Schreb.)Schreb. ex Besser, Enum. Pl. 41. 1822, nomen; (Wulf. & Schreb.) Trautv. Act. Hort. Petrop. 9:329. 1884.

Synonymy:
Triticum vaillantianum Wulfen & Schreber, ap. Schweiger et Koerte, Florae Erlangensis 1:143. 1811.

Agropyron repens (L.)Beauv. var. vaillantianum (Wulf. & Schreb.)R.&S. Syst. Veg. 2:755. 1817.

Agropyron donianum F.B.-White, Proc. Perthshire Soc. Nat. Sci. 1:41 (date?); Scott, Naturalist N.Ser. 4:232. 1890.

Agropyron pseudorepens Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4:34. 1897.

Agropyron tenerum Vasey var pseudorepens Jones, Contrib. West. Bot. 14:19. 1912.

Zeia pseudorepens :unell, Amer. Midl. Nat. 4:226. 1915.

Agropyron repens var. subulatum forma vaillantianum (Wulf. & Schreb.)Fernald, Rhodora 35:184. 1933.

Elytrigia repens (L.)Desv. var. vaillantianum (Wulf. & Schreb.) Prokudin, Proc. Bot. Inst. Kharkov. 3:189. 1938.

Roegneria doniana (F. B.-White)Meld. Svensk. Bot. Tidskrift. 44:157. 1950.

Agropyron trachycaulum (Link)Malte var. majus (Vasey)Fernald f. pseudorepens (Scribn. & Smith) Beetle, Rhodora 54:196. 1952.

Aristida

The Mexican species of Aristida with developed but very short lateral awns may be keyed as follows:

Glumes very unequal in length — Aristida hintonii

Glumes about equal in length

First glume longer, second glume shorter; purple spikelets clumped on naked pedicels

Aristida orcuttiana

First glume shorter, second glume longer; spikelets not clumped

Leaves filiform; inflorescence spicate

Aristida gypsophila

Leaves flat; inflorescence open

Aristida schiedeana

Aristida gypsophila sp. nov.

Perennis; culmi dense caespitosi; planta erecta, 6 - 8 dm alta, laminae filiformae, vaginae et laminae glabrae, ore cum dense pilis lanatae; panicula stricta, spiculae appressae; gluma prima 5 - 6 mm l., gluma secunda paulum magna; lemmata ca 5 mm l., columna 2 mm l., torcida; aristis centralis 10 mm longis, scabris; aristis lateralis vestigias vel usque ad 1 mm l.

Perennial, tufted, culms 6 - 8 dm tall, leaves filiform, curled at the base, plants glabrous; wooly white tufts at the colar area; panicle narrow, the spikelets on short appressed pedicels; first glume ca 5 - 6 mm l., second glume slightly longer; lemma ca 5 mm long; awn column slightly twisted, 2 mm long, central awn 10 mm long, faintly antrorsely scabrous; lateral awns rudimentary or to 1 mm long.

Type collection Johnston, I.M. no. 8399 in the United States National Herbarium, collected August 23 - 25, 1941, Mexico, western Coahuila, north facing mountainside, gypsum banks, western base of Picacho de Fuste, northeasterly from Tanque Vaionetta, about lat. 27 deg. 34'N.

Johnston, I.M. 8714, from western Coahuila, vicinity of Aguaje del Pajarito is apparently the same but is badly smutted. Aristida gypsophila is a part of the endemic floral elements associated with gypsum soils which include Bouteloua chasei and Muhlenbergia gypsophila.

Brachypodium

Key to the Mexican species:

Annual — Brachypodium distachyon

Perennial

Awnless

Leaves filiform, mostly basal — Brachypodium pringlei

Leaves flat, equally distributed — Brachypodium mexicanum var. inerme

Awned

Slender, straggling, the leaves weakly scabrous, spikelets small, 2 - 2.5 cm long — Brachypodium mexicanum

Robust, erect, the leaves strongly scabrous, spikelets large, 3 cm 1 or longer — Brachypodium latifolium

Brachypodium mexicanum var. inerme var. nov.

B. mexicanum similis sed lemmata sine aristas vel aristas inaequalis vestigias.

Like the species but the awns of the lemma either totally lacking or irregularly reduced.

Type collection F.G. Meyer and D.G.Rogers 2978, Mexico, Nuevo Leon, Sierra Madre Oriental, densely tufted perennial to 12 in tall in open pine forest, alt. 3333 m., Cerro del Viejo, 15 mi. west Dulces Nombres, Municipality Zaragosa, August 18, 1948, type in the U.S.National Herbarium.

There is a second collection, Stanford et al. 645 from Tamaulipas, Mexico in the U.S.National Herbarium. The type collection of B. pringlei Scribn. in Beal is Pringle 2525 in the type case and is true B. pringlei. A second sheet of Pringle 2525 in the general collection is B. mexicanum var. inerme. A third sheet of Pringle 2525, also in the general collection, is a mixture of B. pringlei and B. mexicanum var. inerme.

Digitaria biformis Willd.
var. chrysoblepharis (Fig. & DeNot.) comb nov.

D. chrysoblephara Fig. & DeNot. Mem. Acad. Sci. Torino II. 14: 364. 1854, African.

D. ciliaris Retz. var. chrysoblepharis (Fig. & DeNot.) Beetle, Phytologia 48:190. 1981.

D. adscendens (HBK) Henrard, ssp. chrysoblepharis (Fig. & DeNot.)Henrard, Monogr. Digitaria 160, 998. 1950.

Bor (Grasses of Burma, Ceylon, India and Pakistan 299. 1960) has pointed out the differences between D. bicornis and D. biformis. Additionally Veldkamp (Blumea 21: 1 - 80. 1973) has shown that the type of bulbous based bristles which are found in Digitaria ciliaris are not characteristic of the D. bicornis - D. biformis complex.

Erioneuron avenaceum(HBK)Tateoka
var. longearistatum(Kurtz) comb nov.

Synonymy:
Erioneuron grandiflorum (Vasey)Tateoka, Amer. Jour. Bot. 48:572. 1961.

Triodia avenacea HBK var. longearistata Kurtz, Rev. Mus. La Plata 5:301. 1893.

Sieglingia avenacea (HBK) Kuntze var. grandiflora (Vasey) Dewey, Contrib. U.S. Natl. Herb. 2:538. 1894.

Erioneuron avenaceum (HBK)Tateoka var. grandiflorum (Vasey)Gould

Sieglingia grandiflora (Vasey)Beal, Grasses N. Amer. 2:471. 1896.

Triodia grandiflora Vasey, Contrib. U.S.Natl. Herb. 1:59. 1890.

Tridens grandiflorus (Vasey)Woot. & Standl., N.Mex. Coll. Agr. Bull. 81:129. 1912.

The variety longiaristata of Kurtz is based on Pringle 406 from Chihuahua, Mexico. It was identified with Erioneuron pilosum as a synonym of Triodia acuminata (Munro)Vasey by Stuckert in 1904 in his Graminaceas Argentinas and recently was the basis for Erioneuron pilosum (Buckl.)Nash var. longearistatum (Kurtz) Anton, Kurtziana 10:63. 1977. This is clearly in error, and the name Triodia avenacea var longiaristata Kurtz is correctly referred to "Tridens grandiflorus (Vasey) Woot. & Standl. " in Chase's Index to Grass Species.

Koeleria cristata var. geniculata (Fourn.) comb nov.

Achaeta geniculata Fourn. Mex. Pl. 2:109. 1886. Based on Liebman 609 from Mexico.

This name is needed to cover the Mexican plants which have conspicuous rhizomes.

Leptochloa filiformis (Lam.)Beauv.
var. pulchella (Scribn.) comb. nov.

Based on Leptochloa mucronata (Michx.)Kunth var. pulchella Scribn. Bull. Torr. Club. 9:147. 1882, the type, a Pringle collection from Arizona is in the U.S.National Herbarium.

This variety is mostly coastal, and is very abundant at Guaymas, Sonora, Mexico. It is typically dwarf, narrow leaved, with the inflorescence consisting of a few short and divaricately spreading racemes.

Panicum acuminatum Sw. var. fasciculatum (Torr.) comb. nov.

Panicum dichotomum L. var. fasciculatum Torrey, Fl. North and Mid. U.S. 145. 1824.

Panicum implicatum Scribn. in Britt. & Brown, Illustr. Fl. 3:498. 1898.

Panicum acuminatum Sw. var. implicatum Beetle

Dichanthelium acumintum (Sw.)Gould & Clark
var. implicatum (Scribner)G. & C.

See Freckmann, R.W. 1981. Phytologia 48:99-110. Realignments in the Dichanthelium acuminatum complex.

Scleropogon Philippi, Sert. Mendoc. 2:47. 1871.

This genus has traditionally been treated as monotypic but apparently there are two species which may be keyed as follows:

Dioecious, rhizomatous, the panicles scarcely exserted above the leaves, the awns 3 - 5 cm long, at maturity twised and strongly recurved

Scleropogon brevifolius

Monoecious, stoloniferous, the panicles well exserted above the leaves, the awns 5 - 15 cm long, twisted but not strongly recurved

Scleropogon longisetus

S. brevifolius Philippi, An. Univ. Chile 36:206. 1870. Described from Mendoza, Argentina.

Synonymy:
Lesourdia karwinskyana Fourn. Soc. Bot. France Bull. 27: 102. 1880. Described from Mexico.

Lesourdia multiflora Fourn. Soc. Bot. France Bul. 27: 102. 1880. Described from Mexico.

Tricuspis monstrosa Munro in Hemsl. Diagn. Pl. Nov. Mex. 56. 1880, name only, in synonymy.

Scleropogon karwinskyanus (Fourn.)Benth. ex S. Wats., Amer. Acad. Sci. Proc. 18: 181. 1883.

Perennial, rhizomatous, the plants ca. 1 dm tall, densely branching, the leaves basal, the blades flat, 1 - 2 mm wide, 1 - 2 cm long, rather sharp pointed.

All plants dioecious, the inflorescences narrow, few-flowered racemes or simple panicles; staminate and pistillate spikelets strikingly different in appearance, the male large and awnless, the female long-awned; female spikelets one to several flowered, the upper florets reduced to awns, the rachilla disarticulating above the glumes, the florets falling together; glumes acuminate, 3-nerved, the first glume half as long as the second, the lemma narrow, 3-nerved, the nerves extending into slender scabrous spreading awns 5 - 15 cm long, the lowest floret with a sharp-bearded callus; palea narrow, the two nerves near the margin becoming short awns.

The distribution of this species is disjunct. Mexican reports include the northeastern and central states of Nuevo Leon (Beetle M-407 and 642), Tamaulipas, Veracruz (Ventura 1542 and 1543), San Luis Potosi (Beetle M-2112), Hidalgo (Rzedowski 20546 and 20547), and Puebla. This species also occurs in northern Argentina. Similar disjunct distributions are found in Monanthochloe, Blepharidachne, Munroa, Tridens, and Erioneuron. A chromosome count of 2 n equals 40 is based on Reeder and Reeder 4805 from S.L.P.,Mexico.

S. longisetus Sp. nov.

Festuca macrostachya Torr. & Gray, U.S. Rept. Expl. Miss. Pacific 2 (4):177. 1855, name only, based on a staminate specimen from Pecos, Texas.

Perenne, monoica, planta erecta, 1 - 2 dm alta, e basi decumbentes; caespitosa sed etiam stoloniferum cum internodiis 5 - 15 cm longiores; laminae basi, planae, 1 - 2 mm latae, 1 - 2 cm longae, terminae acuminae; Paniculae cum ramis adscendentibus vel poco divergentibus con spiculae appressae; panicula supra laminae; aliquis plantas appare dioica sed alius spiculis masculis et feminis in eadem inflorescentia depositis; spiculae masculae 2 - plures - florae, 2 - 3 cm longae; glumae aequans; spiculae feminina 1 - plures - florae, 2.5 - 3 cm longae; lemmata prima cum callo barbata, acuta, cum aristas 5 - 15 cm longa, torcida.

Perennial, monoecious, the plants 1 - 2 dm tall, loosely tufted but producing wiry stolons with internodes 5 to 15 cm long; leaves basal, the blades flat, 1 to 2 mm wide, 1 - 2 cm long, sharp-pointed.

Spikelets on short appressed pedicels, the panicle well exserted above the leaves; some plants appearing to be dioecious but others with male and female florets in the same inflorescence; male spikelets several flowered, 2 - 3 cm long, the rachilla not disarticulating; glumes about equal, nearly as long as the first lemma; female spikelets one to several-flowered, 2.5 - 3 cm long, disarticulation above the glumes, the florets falling together, the lowest floret with a sharp, bearded callus, the awns 5 - 15 cm long, twisted but not strongly recurved.

Type: Mexico, Coahuila, 28 mi. s. of Saltillo, Sept. 5, 1963, Reeder and Reeder 3626.

This species is found on semiarid plains and poorly drained bottomlands in southern Colorado, Arizona (Gooding 179-47), New Mexico (Beetle 6204) and Texas (Beetle 14922) as well as the states of Sonora, Chihuahua (Pringle 484), Zacatecas (Reeder and Reeder 4713), Coahuila (Reeder and Reeder 3641), Durango, and San Luis Potosi (Reeder and Reeder 4060 and 2938) in noerthern Mexico.

This is not an important range grass although it may serve some purpose in erosion control. Long ago Griffiths proclaimed "It is difficult to conceive of stock being driven to such an extremity as to eat this species" (cf Griffiths, D. 1915. Native pasture grasses of the United States. U.S.D.A. Bull. 201:1 - 52.). The sharp callus penetrates wool with ease. It is commonly called burrograss or "zacate del burro". The distribution patterns of the two species apparently do not overlap although both species have been reported from the state of San Luis Potosi in Mexico.

S. brevifolius is always dioecious, the male and female plants being separate. S. longisetus may appear to be dioecious but apparently all populations have the potential to be monoecious and many such monoecious collections with male and female spikelets in the same inflorescence have been made.

S. brevifolius is essentially a matforming plant with freely branching rhizomes. On the otherhand S. longisetus forms elongate stolons, some leaves forming on the aerial nodes even when not in contact with the ground. There is great variation in the size of the awns found on the female spikelets (5 - 15 cm) of S. longisetus. On the other hand the size of the awns of S. brevifolius is very uniform (3 - 5 cm long).Based on Reeder and Reeder 4607 from Chihuahua, Mexico, the chromosome count, 2 n equals 40, for longisetus, is the same as that for S. brevifolius (cf Reeder,J.R.1967 and 1968. Notes on Mexican grasses VI and VIII. Bull Torrey Botanical Club).

NEW COMBINATIONS IN THE GENUS PACKERA (Asteraceae)

W. A. Weber & Áskell Löve

Of all the collective genera of Bentham and Hooker (1873) and their followers, few are as diverse in habits and habitats as Senecio, a group that, in its strict sense, based on the annual type species S. vulgaris L., is small and clearly defined. Recent estimates of the aggregation suggest that Senecio, sens. latiss., comprises at least a thousand species (Barkley 1978), or 2-3,000 species (Shaw in Willis 1966), or about 3,000 species (Nordenstam 1978b). The genus, as still commonly circumscribed, is a taxonomical potpourri of unusual dimensions.

It is understandable that no one has ventured into a general revision of the senecioid complex, since a thorough study worldwide would require the concerted efforts of a team with numerous skills beyond those of the individual taxonomist. Nevertheless, a few courageous botanists recently have taken a fresh look at parts of the genus, with some success, notably Kirpicznikov (1961) for the taxa met with in the Soviet Union, Nordenstam (1978a,b) basing his studies on morphological and some chemical characteristics of mainly Old World representatives, and Barkley (1978) who studied the North American species. The revisions resulting from these studies are only the first hesitant steps toward a long series of treatments that ultimately may result in a taxonomic division of the immense array of variation into a larger number of biologically well-defined genera.

Although most groups traditionally circumscribed within Senecio seem to be cytologically uninteresting, observations on chromosome numbers have revealed that, whereas the majority of taxa are characterized by the basic number x=10, as in Senecio proper, there are some deviations in basic number that are correlated with morphological trends given sectional rank. This observation has been employed in part in the classification proposed by Nordenstam (1978a) and in the division of Arctic representatives (Löve & Löve 1975, 1976), including the arctic-boreal genus Tephroseris with its basic number x=8 and typically absent outer phyllaries, and the mainly New World genus Packera, consisting of most of the Aurei, Lobati and Tomentosi of Rydberg (1900) and Greenman (1916, 1918), characterized by prolonged rhizomes, distinctive basal/cauline leaf arrangement and form, and characteristic tomentum whenever present. Most of the species of Tephroseris were transferred to it by Holub (1973), but only those species of Packera reaching the Arctic were transferred by Löve & Löve (1976).

Our preliminary observations of other North American representatives of the Senecio complex indicated that some genera

recognized as distinct by Eurasiatic botanists also ought to be given that status on this continent--notably Ligularia (including Cremanthodium). Nordenstam (corresp.), Barkley (corresp.) and Robinson (1979) insist that Weber (1973) transferred the American species to this genus incorrectly, for the floral anatomy of Ligularia is cacalioid and that of the American species (Senecio, Amplectentes) is senecioid. The transfer was made on gross morphological grounds, and while admittedly it does not fit in with current concepts, the fact remains that an alpine senecioid group of the Rocky Mountains resembles the Asiatic genus so closely as to demonstrate a classic example of convergent evolution. If not at home in Ligularia, this group stands as a monophyletic line among American senecionids and deserves generic rank. We are inclined to feel that ultimately several new genera will need to be described in order to accommodate the discrete patterns of morphology which characterize several other American Senecio groups, notably the Suffruticosi and the Triangulares.

In this paper we want to complete the process of transferring to Packera those North American taxa for which there is reasonable morphologic and/or cytological evidence. The morphological evidence on which these transfers are based was reviewed by Barkley (1978), but the cytological support for the distinctness of the genus has been confirmed for various species by Sokolovskaya & Strelkova (1938, 1948), Turner, Powell & King (1962), Wiens & Halleck (1962), Ornduff, Raven, Kyhos & Kruckeberg (1963), Palmblad (1965), Taylor & Brockman (1966), Ornduff, Mosquin, Kyhos & Raven (1967), Johnson & Packer (1968), Taylor & Mulligan (1968), Lee (1969), Packer (1972), Ward (in Love 1981) and Löve & Löve (unpubl.).

PACKERA ACTINELLA (Greene) Weber & Löve, comb. nov. Senecio actinella Greene, Bull. Torr. Bot. Club 10:87. 1883.

PACKERA ANONYMA (Wood) Weber & Löve, comb. nov. Senecio anonymus Wood, Class-book, 464. ed. of 1861.

PACKERA ANTENNARIIFOLIA (Britton) Weber & Löve, comb. nov. Senecio antennariifolius Britton in Britton & Brown, Illus. Fl. 3:478. 1898.

PACKERA BELLIDIFOLIA (H.B.K.) Weber & Löve, comb. nov. Senecio belidifolius H.B.K., Nov. Gen. Sp. 4:175. 1820.

PACKERA BERNARDINA (Greene) Weber & Löve, comb. nov. Senecio bernardinus Greene, Pittonia 3:298. 1898.

PACKERA BOLANDERI (A. Gray) Weber & Löve, comb. nov. Senecio bolanderi A. Gray, Proc. Am. Acad. Arts Sci. 7:362. 1868.

PACKERA BREWERI (Davy) Weber & Löve, comb. nov. Senecio breweri Davy, Erythea 3:116. 1895.

PACKERA CANA (Hook.) Weber & Löve, comb. nov. Senecio canus Hook., Fl. Bor.-Am. 1:333. pl. 116. 1834.

PACKERA CANA f. ERADIATA (D. C. Eaton) Weber & Löve, comb. nov. Senecio canus D. C. Eaton in S. Wats., Bot. King's Exped. 190. 1871.

PACKERA CANDIDISSIMA (Greene) Weber & Löve, comb. nov. Senecio candidissumus Greene, Pittonia 4:110. 1900.

PACKERA CARDAMINE (Greene) Weber & Löve, comb. nov. Senecio cardamine Greene, Bull. Torrey Bot. Club 8:98. 1881.

PACKERA CLEVELANDII (Greene) Weber & Löve, comb. nov. Senecio clevelandii Greene, Bull. Torrey Bot. Club 10:87. 1883.

PACKERA CROCATA (Rydb.) Weber & Löve, comb. nov. Senecio crocatus Rydb., Bull. Torrey Bot. Club 24:299. 1897.

PACKERA CYMBALARIA (Pursh) Weber & Löve, comb. nov. Senecio cymbalaria Pursh, Fl. Am. Sept. 2:530. 1814.

PACKERA CYMBALARIOIDES (Nutt.) Weber & Löve, comb. nov. Senecio cymbalarioides Nutt., Trans. Am. Phil. Soc. II,7:412. 1841.

PACKERA CYNTHIOIDES (Greene) Weber & Löve, comb. nov. Senecio cynthioides Greene, Leaflets 1:212. 1906.

PACKERA DEBILIS (Nutt.) Weber & Löve, comb. nov. Senecio debilis Nutt., Trans. Am. Phil. Soc. II,7:408. 1841.

PACKERA DIMORPHOPHYLLA (Greene) Weber & Löve, comb. nov. Senecio dimorphophyllus Greene, Pittonia 4:109. 1900.

PACKERA DIMORPHOPHYLLA ssp. INTERMEDIA (T. M. Barkley) Weber & Löve, comb. nov. Senecio dimorphophyllus ssp. intermedius T. M. Barkley, Trans. Kans. Acad. 65:362. 1963.

PACKERA EURYCEPHALA (T. & G.) Weber & Löve, comb. nov. Senecio eurycephalus T. & G., Mem. Amer. Acad. II,4:109. 1849.

PACKERA FENDLERI (A. Gray) Weber & Löve, comb. nov. Senecio fendleri A. Gray, Mem. Am. Acad. II,4:108. 1849.

PACKERA FLETTII (Wiegand) Weber & Löve, comb. nov. Senecio flettii Wiegand, Bull. Torrey Bot. Club 26:137. 1899.

PACKERA FRANCISCANA (Greene) Weber & Löve, comb. nov. Senecio franciscanus Greene, Pittonia 2:19. 1889.

PACKERA GANDERI (Barkley & Beauchamp) Weber & Löve, comb. nov. Senecio ganderi Barkley & Beauchamp, Brittonia 26:106. 1974.

PACKERA GREENEI (A. Gray) Weber & Löve, comb. nov. Senecio greenei A. Gray, Proc. Am. Acad. Arts Sci. 10:75. 1874.

PACKERA HARTIANA (Heller) Weber & Löve, comb. nov. Senecio hartianus Heller, Bull. Torrey Bot. Club 26:622. 1899.

PACKERA HESPERIA (Greene) Weber & Löve, comb. nov. Senecio hesperius Greene, Pittonia 2:166. 1891.

PACKERA IONOPHYLLA (Greene) Weber & Löve, comb. nov. Senecio ionophyllus Greene, Pittonia 2:20. 1889.

PACKERA LAYNEAE (Greene) Weber & Löve, comb. nov. Senecio layneae Bull. Torrey Bot. Club 10:87. 1883.

PACKERA LORATIFOLIA (Greenman) Weber & Löve, comb. nov. Senecio loratifolius Greenman, Proc. Amer. Acad. Arts Sci. 43:21. 1907.

PACKERA MACOUNII (Greene) Weber & Löve, comb. nov. Senecio macounii Greene, Pittonia 3:169. 1897.

PACKERA MILLEFOLIA (T. & G.) Weber & Löve, comb. nov. Senecio millefolium T. & G., Fl. N. Am. 2:444. 1843.

PACKERA MILLELOBATA (Rydb.) Weber & Löve, comb. nov. Senecio millelobatus Rydb., Bull. Torrey Bot. Club 27:171. 1900.

PACKERA MULTILOBATA (T. & G. ex A. Gray) Weber & Löve, comb. nov. Senecio multilobatus T. & G. ex A. Gray, Mem. Amer. Acad. Arts Sci. II,4:109. 1849 (Pl. Fendlerianae).

PACKERA NEOMEXICANA (A. Gray) Weber & Löve, comb. nov. Senecio werneriaefolius A. Gray, Syn. Fl. N. Am. 1(2):392. 1884.

PACKERA NEOMEXICANA var. MUTABILIS (Greene) Weber & Löve, comb. nov. Senecio mutabilis Greene, Pittonia 4:113. 1900.

PACKERA NEWCOMBEI (Greene) Weber & Löve, comb. nov. Senecio newcombei Greene, Pittonia 3:249. 1897.

PACKERA OBOVATA (Muehl. ex Willd.) Weber & Löve, comb. nov. Senecio obovatus Muehl. ex Willd., Sp. Pl. 3:199. 1804.

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PACKERA PSEUDAUREA (Rydb.) Weber & Löve, comb. nov. Senecio pseudaureus Rydb., Bull. Torrey Bot. Club 24:208. 1897.

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DR. HANS HÖRMANN

(1902 - 1981)

Because of his interest in mosses, we Degeners visited Dr. and Mrs. Hörmann in their 1964 home in Exenbach and in their 1972 home in St. Georgen, both in Austria. We were so impressed by Dr. Hörmann's ability, accomplishments and industry, though condemned to working from a wheelchair, that Bryologist Douglas R. Smith joined us in publishing a tribute to him and Mrs. Hörmann in our "Flora Hawaiiana" Sept. 20, 1980. From this we repeat slightly modified excerpts:

Hans Hörmann was born May 7, 1902 in Friedersbach, Waldviertel, Austria. In 1907 the family settled in nearby Waldhausen, where his father was a teacher and later Principal of the local school. For his higher education the son attended the Gymnasium in Linz from 1914 until his graduation in 1922. Thereafter he attended a private school in the same city until 1925. He was then enrolled in the University of Graz until 1930, studying the Natural Sciences and especially Botany. He married Paula Marchsteiner in 1929. While still a graduate student he contracted poliomyelitis in 1930, just before receiving his doctorate. That malady changed his entire future.

Dr. Hörmann lost his salaried University position after three months of illness; but whenever townspeople in Graz met him, they still called him "Herr Professor". His resourceful wife Paula thereafter provided for their total support as teacher and later as Principal. During the Second World War, Dr. Hörmann was evacuated from Graz to his mother's home in Waldhausen to escape the bombing; while Mrs. Hörmann remained in Graz to continue earning their livelihood.

In 1945 he was able to renew his researches on mosses, his illustrations being of high quality and showing details for identification. Because of the ease of handling the diminutive specimens at his small work table, Dr. Hörmann has been able to study a wide range of bryophytes, many sent from the Hawaiian Islands. In fact, he was the main expert who helped us publish ten pages dealing chiefly with a synoptic key of the "Mosses of Hawaii" in March 31, 1973 to supersede the excellent but aged one by E.B. Bartram in 1933. We have additional manuscript about Hawaiian mosses which we plan to publish in collaboration with our late friend. The bulk, however, of his publications have been based on specimens sent him by scientists in other parts of the World. He became recipient of the Kosmos Medal.

At the age of 78 he wrote us in 1980 that his eyesight no longer permitted his work at the microscope, and that his strength had waned to the point where he was no longer able to work on his beloved plants. Thus ended a career in bryology that spanned a half century. We shortly received the sad news from Mrs. Hörmann that her husband had died May 20, 1981, and had been interred in the family grave in St. Georgen, Ybbsfeld, Austria.

Otto & Isa Degener, and Douglas R. Smith.

A NEW SPECIES OF PROSOPANCHE (HYDNORACEAE) FROM COSTA RICA.

Luis D. Gómez P. & Jorge Gómez-L.

Museo Nacional, Apto. 749, San José, Costa Rica.

The family Hydnoraceae contains two genera: Hydnora with 6-10 species in the Afro-Madagascan region, and Prosopanche with two southern South American species recently monographed (Cocucci,1965): P. americana (R.Br.) Baillon and P. bonacinae Spegazzini. The latter genus has been considered as extratropical in the New World, with a doubtful record from eastern Peru (Harms, 1935). But the geographical distribution of the New World Hydnoraceae is amplified by the finding of a Costa Rican, rainforest inhabiting species here described as:

Prosopanche costaricensis Gómez & Gómez-L.

P. americanae affinis a qua imprimis differt statura minore, characteribus seminum, forma et dimensione synandrium.

Herba perenne, hypogea, holoparasitica, erecta, stolonifera; radices (4)-5-gona (sect. transv.) dense rudimenta haustoriorum emittens. Flores ascendentes pedicellus cum ovario 15-20 cm longus; synandrium elliptico-conicum 19-26 mm longum 11-15 mm latum; stigmata 3-radiata pauciter lobulata, lamellae ± 12-plicatae; semina 1-1.2 mm longae testis ruguloso-verrucosis.

Holotypus: Finca La Lola, callejón sección 18, Siquirres, Limón, 50 m, Gómez 7335, CR. Isotypes: BM, US, F, MO, USJ. Paratype: L.C. González in Gómez-L. 6770 CR.

Plant hypogean, parasitic on roots of Leguminosae. Pilot roots (4)-5-angular with numerous haustorial rudiments on the aristae.Stem massive, nodose. Leaves or bracts absent. Flowers in clumps, emergent, tubular, pedicellate, pedicel 5-(8.9)-11 cm long, 10-16 mm in diameter. Corolla tepaline, 3-merous, tepals 2.4-3.6 cm wide, 3.2-5.6 cm long, anthesis valvate, with tepals joined by their apices so as to form a lantern-like structure. Synandrium elliptic-conical or ovoid, 19-(21.78)-26 mm long, 11-(12.52)-15.7 mm wide at the middle, white when young, dark brown to almost black when mature. Perigonial tube narrow, inner diameter 10-15 mm, short (less than 1 cm). Stigmatic surface button-like, 3-radiate, the lamellae with no more than 12 folds per side. Ovules much reduced, numerous. Fruit a pseudoberry, peponid, more or less globose, up to 50 mm in diameter when ripe, crowned by the remains of the perigonial tube, dehiscence transversal and irregular, more or less medial. Mature placentae fleshy, white, faintly sweet-scented. Seed small, 1-1.2 mm long, irregular, somewhat elliptic in contour, episperm rugulose-verrucose, black and hard.

The species closely allied to Prosopanche americana but differs from it in general dimensions of habit and structures, the fascicled flowers, host and geographical distribution. From the two previously known species in the genus, P. costaricensis differs in having verrucose seeds, less than 12 folds per side of stigmatic lamellae (no less than 14 in P. americana, no more than 8 in P. bonacinae), by the size of the synandrium and by its staminodia subtended by a very low foot so as to be almost sessile. Two populations were observed and collected. In both localities the host tree was Inga oerstediana Benth., but in one of the locations there was also an specimen of Gliricidia saepium (Jacq.)Steud.

The plants of Prosopanche costaricensis are found covered by the thick litter of the rainforest and very difficult to spot. The biology of these unusual organisms, previously associated with arid and subarid vegetation types, should prove rewarding.

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Prosopanche costaricensis Gómez & Gómez-L.
apx. 1/2 X.

A NEW SPECIES OF ARBORESCENT PASSIFLORA (ASTROPHEA) FROM COSTA RICA

Jorge Gómez-L. & L. D. Gómez P.

Museo Nal., Aptdo. 749, San José, Costa Rica

Within the genus Passiflora, the species in subgenus Astrophea are trees or large shrubs and are particularly abundant in South America. A new species is here described from Costa Rica as:

Passiflora tica Gómez-L. & Gómez P.

P. arboreae affinis, a qua imprimis differt suavis odoris, coronis 2-seriatis, foliis strigosis, filamentibus et estylibus persistentibus.

Arbor ad 7 m alta vel frutex procerus. Folia petiolata, petiolus 3-4.5 cm longus, obscure striato-canaliculatus; lamina amplissime elliptico-oblonga vel e.-obovata, penninervia, integerrima, 12.5-(22.42)-39 cm longa, 6.5-(13.05)-23 cm lata, apicem acuminata breviter mucronata, ad basim obtuso-rotundata, supra glabra, subtus strigosa, aromatica; calycis tubus cylindricus,sepalis petalisque oblongo-subpanduratis, corona 2-seriata, filamentis extimis 7 mm longis, dolabriformibus, alteris brevioribus (3-4 mm longis), tereto-digitiformibus; operculum tubulosum, non exsertum, erosum, limene membranosum, cupulatum; ovarium obscure trigonum, dense tomentosum.

Holotypus: Márgenes del río San Lorenzo, San Ramón, Alajuela, apx. 1200 m.s.m., J. Gómez-L. 6627 (CR). Isotypi: same locality, Gómez-L. 5019 (USJ, MO, F). Paratypi: Chitaría de Turrialba, Cartago, 600 m.s.m., L. Poveda 967 (USJ, CR); same locality, L. D. Gómez 60 74 (US).

Tree or large shrub. Branches terete, without tendrils. Leaves elliptic-oblong to e.-obovate, entire, 12.5-39 cm long, 6.5-23 cm wide, apex acuminate and shortly mucronate, rounded obtuse at base, aromatic when crushed (scent like that of Pimpinella), glabrous above, strigose beneath; calyx cylindrical, corona 2-seriate, the outer ones 7 mm long, dolabriform, the inner ones much reduced (3-4 mm), fleshy, terete, digitiform; operculum tubulose, not exserted, limen membranose, cupuliform, ovary subtrigonous, densely tomentose.

Closely related to P. arborea Spreng., from which it differs in having a 2-seriate corona and the much larger, strigose leaves. In Costa Rica the closest congener is P. pittieri Masters which is set appart from P. tica by the presence of tendrils, the 5-seriate corona and the much smaller and non-aromatic leaves.

It is suspected that P. tica be the larval food plant of the South American butterfly Heliconius eluchia, found in Costa Rica within the geographical range of the new species of passionflower. This butterfly, closely related to H. sapho and H. hewitsoni which feed on Passiflora pittieri in Costa Rica, belongs to a group of Heliconiinae specializing in feeding on Passiflora subg. Astrophea.

NOTES ON NEW AND NOTEWORTHY PLANTS. CXLVIII

Harold N. Moldenke

VERBENA CATAMARCENSIS Mold., sp. nov.

Herba perennis, ramis ramulisque minute puberulis tetragonis griseis; foliis oppositis laminis profunde pinnato-partitis, partis subuniforme 2 mm. latis supra atroviridibus minutissime puberulis glabrescentibus, subtus densissime puberulis (costa excepta), costa uniforme 2 mm alata, petiolo ca. 2 cm. longo alato in costam confluente; inflorescentiis terminalibus; pedunculis filiformibus 1--3 cm. longis minutissime puberulis glabrescentibus; calycibus tubulosis ca, 5 mm. longis dense breviterque pubescentibus, pilis erectis; corollis lilacinis.

A perennial herb, the stems and branches slender, gray, tetragonal, minutely puberulent; branchlets and twigs more slender, more acutely tetragonal, stramineous; leaves abundant, decussate-opposite, often with a pair of much smaller ones on much abbreviated twiglets in their axils, to 8 cm. long and 6 cm. wide (in outline), very deeply and uniformly pinnately parted to about 1 mm. from the midrib, the divisions uniformly about 2 mm. wide, apically acute, dark-green, shiny, and very minutely puberulent (soon glabrescent) above, permanently very densely puberulent (except for the midrib) beneath with slightly cinereous hairs; midrib and secondaries decidedly prominulous and conspicuous beneath and plainly green and only very slightly and inconspicuously puberulous or soon glabrescent; petioles about 2 cm. long but not distinguishable from the alate leaf-midrib which is decurrent into it; inflorescence terminal and in the uppermost pair of leaf-axils, 2--6 cm. long, many-flowered; peduncles filiform, 1--3 cm. long, very minutely puberulent or soon glabrescent; bracts lanceolate, very small, about 2 mm. long, apically attenuate-acute; calyx tubular, about 5 mm. long, densely short-pubescent with erect brownish hairs; corolla lilac.

The type of this distinctive species was collected by A. L. Cabrera (*no. 14149*) at Quebrada de la Cebila, Catamarca, Argentina, on March 12, 1961, and is deposited in the United States National Herbarium in Washington.

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ADDITIONAL NOTES ON THE GENUS *PRIVA*. IX

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PRIVA Adans.

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Post & Kuntze (1904) divide the genus into the following Sections: (1) *Eublairia* Kuntze [*Blairia* Adanson, 1763, *Patya* Neck., 1790, *Aparinaria* Schau., 1847], (2) *Bursera* Kuntze [Loefl., 1758, *Priva* Adans., 1763, *Eupriva* Schau., 1847] and (3) *Castelia* Benth. & Hook. f. (Cav.). Loefling, however, proposed a "*Burseria*", not "*Bursera*".

Excluded species:

Priva betulaesfolia H.B.K. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 2;, sphalm. 1979 = *Phyla betulaefolia* (H.B.K.) Greene.

PRIVA ADHAERENS (Forsk.) Chiov.

Additional synonymy: *Priva leptostachya* Kobuski ex Chiov., Fl. Somal. 1: 274, in syn. 1929 [not *P. leptostachya* A. L. Juss., 1806, nor L., 1940, nor H. H. W. Pearson, 1966].

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PRIVA AFRICANA Mold.

Additional bibliography: Mold., Phytologia 43: 332. 1979; Mold., Phytol. Mem. 2: 241, 246, & 572. 1980.

PRIVA ANGOLENSIS Mold.

Additional bibliography: Mold. , Phytologia 43: 332. 1979; Mold., Phytol. Mem. 2: 234 & 572. 1980.

PRIVA ARMATA S. Wats.

Additional bibliography: Mold., Phytologia 43: 420. 1979; Mold., Phytol. Mem. 2: 66 & 572. 1980.

PRIVA ASPERA H.B.K.

Emended synonymy: *Priva aspera* Jumb. & Bonpl. apud Steud., Nom. Bot. Phan. , ed. 1, 657. 1821.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1 , 657 (1821) and ed. 2, 2: 397. 1841; D. Dietr., Syn. Pl. 3: 606. 1843; Hillebrand, Fl. Haw. Isls., imp. 1, 341. 1888; B. L. Robinson, Proc. Amer. Acad. Sci. 5: 531. 1916; Mold., Phytologia 43: 420 (1979) and 44: 102. 1979; Mold., Phytol. Mem. 2: 66, 73 , 76, 78, 79 , 82, 359, 434, & 572. 1980; Seymour, Phytol. Mem. 1: 245. 1980; Hillebrand, Fl. Haw. Isls., imp. 2 [Cramer, Repr. U. S. Floras 9:] 341. 1981.

Dr. Sousa, in a personal communication to me, records this species from Quintana Roo, Mexico. Recent collectors describe it as an erect herb, 1 m. tall, the inflorescence-axes dull-purple, and the fruit turning black and fleshy. The corollas are said to have been "lilac-pink" on *Brenan 14465*.

Material of this species has been misidentified and distributed in some herbaria as *"Labiatae"*. On the other hand, the *Cochrane, Kolerman, & Cochrane 8651*, distributed as *P. aspera*, actually is *P. lappulacea* (L.) Pers., while *Arguelles 1299* is *P. mexicana* (L.) Pers. The "*Priva aspera*" listed by Hillebrand (1888, 1981) is actually *Salvia occidentalis* Sw. in the *Lamiaceae!*

Additional citations: MEXICO: Chiapas: *Brenan, Brenan, & Greenwood in Brenan 14465* (W--2892124).

PRIVA AURICOCCEA Meeuse

Additional bibliography: Mold., Phytologia 43: 334. 1979; Mold., Phytol. Mem. 2: 243 & 572. 1980.

PRIVA BAHIENSIS P. DC.

Additional bibliography: C. Muell. in Walp., Ann. Bot. Syst. 5: 706. 1860; Mold., Phytologia 43: 420--421. 1979; Mold., Phytol. Mem. 2: 161, 178, & 572. 1980; Mold. & Bromley in Harley & Mayo, Toward Checklist Fl. Bahia 192. 1980; Mold., Phytologia 47: 461. 1981.

Recent collectors describe this plant as a tall herb, to cm. in height, with green fruit, and have encountered it at 50 m. altitude, fruiting in March, recording the vernacular name, "pega-pinto".

Additional citations: BRAZIL: Bahia: *Hage 234* (Ld).

PRIVA BOLIVIANA Mold.

Additional bibliography: Mold., Phytologia 43: 421. 1979; Mold., Phytol. Mem. 2: 175, 178, 190, & 572. 1980.

PRIVA CORDIFOLIA (L. f.) Druce

Additional & emended bibliography: Roxb., Hort. Beng., imp. 1, 46. 1814; Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; Roxb., Fl. Ind., ed. 2, imp. 1, 3: 90--91. 1832; G. Don in Sweet, Hort. Brit., ed. 3, 552. 1839; C. Muell. in Walp., Ann. Bot. Syst. 5: 706. 1860; Roxb., Fl. Ind., ed. 2, imp. 2, 488. 1874; Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] 232--233. 1888; Vierh., K. Akad. Wiss. Wien Denkschr. 71: 114--115 [434--435]. 1907; Marloth, Fl. S. Afr. 3: 146. 1932; Roxb., Fl. Ind., ed. 2, imp. 3, 488. 1971; Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 296. 1979; Mold., Phytologia 43: 421--426 (1979) and 44: 92, 108, & 109. 1979; Mold., Phytol. Mem. 2: 204, 256, 257, 265, 269, 271, 273, 275, 359, 434, & 572. 1980; Roxb., Hort. Beng., imp. 2, 46. 1980.

PRIVA CORDIFOLIA var. *ABYSSINICA* (Jaub. & Spach) Mold.

Additional & emended bibliography: C. Muell. in Walp., Ann. Bot. Syst. 5: 705. 1860; Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] 232--233 & 433. 1888; Vierh., K. Akad. Wiss. Wien Denkschr. 71: 114--115 [434--435]. 1907; Mold., Phytologia 43: 424--426. 1979; Mold., Phytol. Mem. 2: 199, 201--204, 224, 227, 231, 238, 239, 241, 246, 251, 253, 434, & 572--573. 1980.

Kazmi refers to this plant as a "shrub", 1 m. tall, and his material has been misidentified and distributed in some herbaria as *P. curtisiae* Kobuski.

Additional citations: SOMALIA: *Kazmi 341* (Mu).

PRIVA CORDIFOLIA var. *AUSTRALIS* Mold.

Additional bibliography: Mold., Phytologia 43: 424 & 426 (1979) and 44: 109. 1979; Mold., Phytol. Mem. 2: 241, 246, & 573. 1980.

Dahlstrand found this plant growing on sandstone, at 900 m. altitude, in fruit in May. His material has been misidentified and distributed in some herbaria as *P. meyeri* Jaub. & Spach.

Additional citations: SOUTH AFRICA: Transvaal: *Dahlstrand 1638* (Go).

PRIVA CORDIFOLIA var. *FLABELLIFORMIS* Mold.

Additional bibliography: Mold., Phytologia 44: 92 & 109. 1979; Mold., Phytol. Mem. 2: 221, 224, 227, 236, 238, 239, 241, & 573. 1980.

PRIVA CURTISIAE Kobuski

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 55. 1948; Mold., Phytologia 44: 92--93. 1979; Mold., Phytol. Mem. 2: 227, 231, & 573. 1980.

The *Kazmi 341*, distributed as *P. curtisiae*, actually is *P. cordifolia* var. *abyssinica* (Jaub. & Spach) Mold.

PRIVA DOMINGENSIS Urb., Symb. Antill. 7: 354. 1912.

Additional & emended bibliography: Urb., Symb. Antill. 7: 354. 1912; Mold., Phytologia 44: 93. 1979; Mold., Phytol. Mem. 2: 96 & 573. 1980.

Although the original Urban description of this taxon is often cited as "1911" or "1912", it was actually published on October 1, 1912.

PRIVA GRANDIFLORA (Ort.) Mold.

Additional bibliography: Mold., Phytologia 44: 93--95. 1979; Mold., Phytol. Mem. 2: 66, 359, & 573. 1980.

Recent collectors have found this plant growing on pine savannas and mesquite-nopal savannas on gentle slopes of reddish sandy loam in a valley between farms of corn and *Agave*, among scrub junipers on rock alluvium of plateaus, in oak and sparse pine forests, "in red soil with weeds", in cutover fields planted with trees of *Eucalyptus*, *Erythrina*, and *Acacia*, and among shrubs and many *Lupinus marshallianus*, at 5850--8500 feet altitude, in flower in July. Arsene refers to the plant as "pungent".

Material of this species has been misidentified and distributed in some herbaria as *Verbena* sp. and as *V. chamaedryfolia* var. *melindres* Cham.

Additional citations: MEXICO: Chihuahua: *Ellis, Dunn, & Wallace 918* (Lb--129933). Durango: *Johnston & Ettlinger 2664* (Me); *Johnston & Johnston 1828* (Me--129807); *LeDoux & Dunn 1909* (Lb--129502). Guanajuato: *Kishler 395* (Me--268668), *699* (Me--274983). Mexico: *Hess, Dziekanowski, Case, Dunn, Trott, & Thurm 1219* (Lb--153563); *Wieder, Dunn, Bennett, & Torke 86* (Lb--139199). Michoacán: *Arsène 2721* (Me--185506). Zacatecas: *Lane & Longstreth 2707* (Au).

PRIVA HUMBERTI Mold.

Additional bibliography: Mold., Phytologia 44: 95. 1979; Mold., Phytol. Mem. 2: 251 & 573. 1980.

PRIVA LACINIATA Mold.

Additional bibliography: Mold., Phytologia 44: 95. 1979; Mold., Phytol. Mem. 2: 105 & 573. 1980.

PRIVA LAPPULACEA (L.) Pers.

Additional synonymy: *Tamonea lappulacea* Pers., in herb.

Additional & emended bibliography: Sandmark in L., Amoen. Acad. 5: 375. 1759; Aubl., Hist. Pl. Guian. Fr. 1: 16. 1775; J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 1, 2: 41. 1791; Steud., Nom. Bot. Phan., ed. 1, 657 & 873. 1821; Loud., Hort. Brit., ed. 1, 246. 1830; Schlecht. & Cham., Linnaea 5: 99. 1830; Sweet, Hort. Brit., ed. 2, 418. 1830; Loud., Hort. Brit., ed. 2, 246. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 552. 1839; Steud., Nom. Bot., ed. 2, 2: 397 & 750. 1841; D. Dietr., Syn. Bot. 3: 606. 1843; C. Muell. in Walp., Ann. Bot. Syst. 5: 706. 1860; Ulrich, Internat. Wörterb., ed. 1, 185 (1871) and ed. 2, 185. 1875; Stahl, Estud. Fl. Puerto Rico, ed. 1, 3: 287--288 & 363. 1888; Baill., Hist. Pl. 11: 94. 1891; J. C. Willis, Dict. Flow. Pl., ed. 2, 530 (1903) and ed. 3, 546. 1908; Urb., Symb. Antil. 4: 534. 1911; J. C. Willis, Dict. Flow. Pl., ed. 5, 539. 1925; Stahl, Estud. Fl. Puerto Rico, ed. 2, 3: 287--

288 & 363. 1937; H. N. & A. L. Mold., Pl. Life 2: 33. 1948; Metcalfe & Chalk, Anat. Dicot. 2: 1040. 1950; J. C. Willis, Dicot. Flow. Pl., ed. 6, 539. 1951; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 302, fig. 130 A. 1957; D. Powell, Bull. Inst. Jam. Sci. 15 (2): 424. 1973; Fournet, Fl. Illust. Phan. Guad. Mart. 1399--1400, fig. 665. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 53. 1978; Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 296. 1979; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 30. 1979; Mold., Phytologia 44: 95--105. 1979; Mold., Phytol. Mem. 2: 23, 50, 66, 70, 73, 74, 76--79, 82, 84--87, 90, 92, 94, 96, 98, 99, 101, 102, 104, 105, 111, 118, 123, 125, 126, 129, 131, 135, 161, 175, 211, 317, 359, 375, 411, 434, 437, 444, 448, 449, 463, & 573. 1980; Seymour, Phytol. Mem. 1: 245. 1980; Wiggins, Fl. Baja Calif. [532] & 533, fig. 501. 1980; Mold., Phytologia 47: 414. 1981.

Additional & emended illustrations: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 302, fig. 130 A. 1957; Fournet, Fl. Illust. Phan. Guad. Mart. 1400, fig. 665. 1978; Wiggins, Fl. Baja Calif. [532], fig. 501. 1980.

Recent collectors have found this plant growing at the lower edge of tropical deciduous forests with canopy trees 4.6--10.7 m. tall, in association with spiny legumes, *Bursera simarouba* and *Ficus* in large limestone canyons with *Muntingia calabura, Bauhinia divaricata, Piper,* and *Croton,* in pastures and disturbed pastures, gallery forests, weedy fields, the understory of low deciduous forests, and in roadcuts on inland steep slopes with disturbed mostly deciduous forest and scattered large trees (mostly *Ficus*), the ridges and upper Pacific gentle slopes with coffee plantations and a tall understory of mostly evergreen trees, sometimes in association with *Sida* and *Heliotropium,* on steep slopes and cliffs, rocky slopes bordering intermittent streams, and ridges, sometimes "common" or "uncommon" along roadsides, "common in shade on hillsides". in forest shade, or "common in cutover tall wet forests and roadsides with scattered individual trees and small remnant patches of forest", at sealevel to 100 m. altitude, in flower in February, July, August, and December, and in fruit in February and July. The corollas are said to have been "blue" on *Foster & al. 3307, Stevens 2798,* and *Steyermark & Espinoza 108774,* "pale-purple" on *Stevens 2710, 4693, & 9380,* "very pale-purple" on *Stevens 9082,* "purple" on *Forero & al. 1902,* "purple-pink" on *Lemke 40,* "pale-blue with 2 longitudinal violet stripes" on *Lasseign P.21182,* and "lavender-blue" on *Croat 34678.* Stevens refers to it as "uncommon". The vernacular name, "cadillo", has been reported.

Seymour (1980) cites the following collections from Nicaragua: Chontales: *Seymour 6040.* Granada: *Dudley & Moore 1983, Hall & Bockus 7539, Seymour 7515.* Managua: *Seymour 752* & *2338.* Masaya: *Nervaez 97.* Matagalpa: *Atwood 2487.* Rio San Juan: *Seymour 6189.*

Additional citations: MEXICO: San Luis Potosi: *Cochrane, Kolterman, & Cochrane 8651* (Ld). Tabasco: *Romero, Gonzalez, & Miranda s.n.* [C. Cowan 1689] (Au, N). Tamaulipas: *Lemke 40* (Au). NICARAGUA: Carazo: *W. D. Stevens 2710* (Ld), Chontales: *W. D. Stevens 2798* (Ld), *4019* (Ld).

[to be continued]

NEW SPECIES OF JUSTICIA (ACANTHACEAE)

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Recent efforts to identify specimens of Justicia collected in Sonora, Mexico and Arizona have resulted in the recognition of the following undescribed taxon.

JUSTICIA SONORAE Wassh., sp. nov.

Herba ramosa, caulibus simplicibus vel modice ramosis, ascendentibus, subquadrangularibus, glabris vel sericeis; lamina foliorum ovata, acuminata, basi obtusa, aliquanto firma, integra vel undulata, costa et venis lateralibus sericeis, cystolithis prominentibus; spicae plures, terminales et axillares, laxae, rhachibus pubescentibus; bracteae ovatae, acutae carinatae, parce puberulae; bracteolae lanceolatae, bracteolis similes; calycis segmenta 4, lanceolata, graciliter acuta, hirtella; corolla violacea ad purpuream, glabra vel parce hirtella, labiis subaequilongis, labio superiore suberecto, ovato, apice ipso truncato, labio inferiore patulo, 3-lobato, lobis obovatis, rotundatis; stamina exserta, lobis antherarum leviter superpositis; capsulae clavatae, puberulae.

Perennial herb to 45 cm high; stems weak, erect or ascending, simple or moderately branched, subquadrangular, shallowly grooved, glabrous or sericeous, the hairs more or less in two lines, internodes 3.5-9 cm long, cystoliths numerous, subpunctiform; leaf blades ovate, 2-5.5 cm long, 1.2-2.2 cm wide, acuminate, obtuse at base, entire or undulate, moderately firm, the costa and lateral veins (3-4 pairs) sericeous, the hairs similar to those on the stems, the intercostal areas essentially glabrous, cystoliths prominent under magnification; petioles slender, 5 mm long, the channel sparingly sericeous; flowers borne in axillary and terminal spikes, these rather lax, 3-10 cm long, 0.7-3 cm wide, the peduncle 1-2.5 cm long, subquadrangular, 0.75 mm thick, puberulous, the rachis glandular pubescent, lowermost internodes 2 cm long, successively shorter towards the tip of the spike; bracts ovate, 3.5 mm long, 1.4 mm wide at base, acute conduplicate, sparingly puberulous; bractlets lanceolate, 4 mm long, 0.75 mm wide, narrowed to a slender tip, in other respects similar to the bracts; calyx 5.5 mm long, deeply segmented, the segments 4, lanceolate, the anterior and posterior segments 0.75 mm wide below middle, the lateral segments 0.5 mm wide, all narrowed to a slender tip, the outer surface moderately hirtellous, the hairs intermixed with slightly longer and more rigid glandular ones, the inner surface glabrous; corolla violet to purple, 3-3.5 cm long, glabrous to sparingly hirtellous, the hairs spreading, straight, the tube narrowly campanulate, 3 mm

broad at base, narrowed at 5 mm above base to 2 mm, thence gradually enlarged to 5 mm at mouth, the upper lip suberect, ovate, 1.1 cm long, 6.5 mm wide at base, gradually narrowed to 1.2 mm at tip, the tip itself truncate, the lower lip more or less spreading, deeply 3-lobed, 1.7 cm long, 1 cm wide at base of lobes, these obovate, 1 cm long, the middle lobe 7 mm wide, the lateral ones 6 mm wide, all rounded at tip; stamens exserted about 5 mm beyond mouth of corolla tube, the filaments flattened. anther lobes slightly superposed, about 1.5 mm long, attached vertically to a relatively narrow connective, pollen grains 2-porate, bilateral, 52 u long, 37 u wide; capsules clavate, 1.2 cm long, 3 mm broad, 1.8 mm thick, puberulous, some of the hairs glandular; seeds 4, brownish, cordate, flattened, about 2 mm long and wide, and 0.5 mm thick, muricate, the projections low and rounded.

Type. T. R. Van Devender s. n. (holotype US, isotype ARIZ), Mexico, Sonora: 17.2 m S-SE of Magdalena, palm canyon in Cerro Cinta de Plata (= Sierra Babiso), 13 Feb 1977.

Distribution. Growing on steep banks and slopes and near bottom of shaded arroyo in Sonora, Mexico and Arizona, at elevation between 700 and 1,130 m. Dominant perennial plant association: Quercus arizonica, Juglans major, Fraxinus velutina, Agave ochoui and Muhlenbergia dumosa. Arizona. Cochise County: Kiper Springs, 110° 24' W, 32° 03' N, 7 May 1979, R. M. Turner 79-77 (ARIZ, US). Mexico. Sonora: Palm Canyon, 17 m SE of Magdalena, Cerro Cinta de Plata (Sierra Babiso), 9 Mar 1979, D. Steadman & K. Schmidt s. n. (ARIZ); 19 Mar 1978, Niall F. McCarten & Roxanne L. Bittman 2693 (ARIZ); 27-29 Nov 1977, Mike Fay 714 (ARIZ); 8-9 Apr 1977, T. R. Van Devender, M. C. Kearns & K. L. Cole s. n. (ARIZ, US); 2.3 m E of Rio de Bavispe by Huasabas to El Coyote and Huachinera Road, 109° 16' W, 29° 56' N, 18 Mar 1979, F. W. Reichenbacher 215 (ARIZ). Cultivated in greenhouse at Desert Botanical Garden, Papago Park, Phoenix, Arizona, 29 Dec 1978, R. G. Engard s. n. (US).

Justicia sonorae is not nearly allied to the other known species.

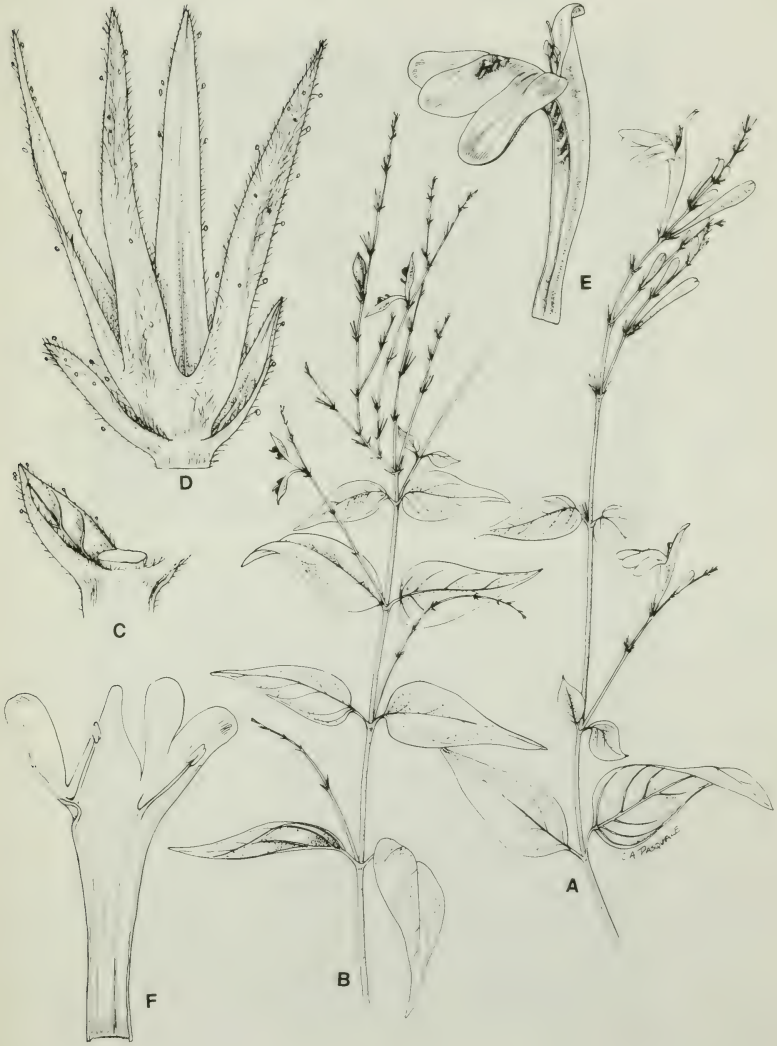

Fig. 1. Justicia sonorae Wassh.: A, habit x $\frac{1}{2}$; B, habit with capsules, x $\frac{1}{2}$; C, bract, x 5; D, bractlets and calyx, x 15; E, corolla, x $1\frac{1}{2}$; F, corolla expanded, x $1\frac{1}{2}$.

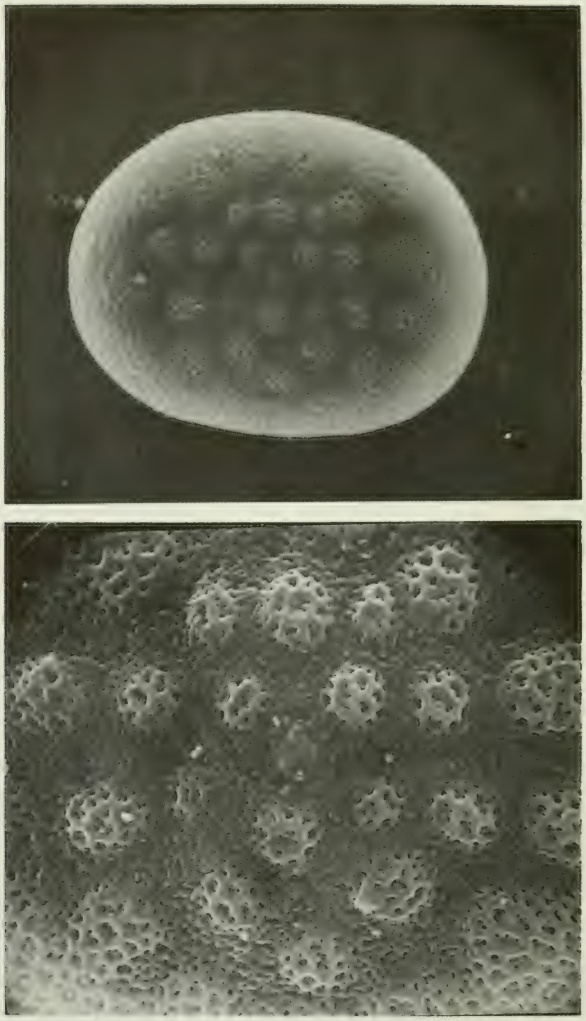

Fig. 2. Pollen grain of Justicia sonorae Wassh., (R. G. Engard s.n.); above, equitorial view, x 1400; below, surface view showing the unevenly spaced insulae surrounding the aperture, x 3000.

MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, XIII

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BACCHARIS AYACUCHENSIS Cuatr. sp. noc.

Frutex ramosus erectus ud 2 m altus, ramis ultimis robustis striolatis, brunnescenti viridibus dense subtomentosis pilis uniseriatis crassiusculis patulis, rectis vel curvis basim versus incrassatis, basi conica, apice acuto, 0.2-0.6 (-0.8) mm longis.

Folia alterna crassiuscula subcoriacea rigidula atroviridia in sicco brunnescentia fragiliaque, breviter petiolata. Lamina lanceolata apicem attenuata acutissima, basim cuneata margine serrata dentibus antrorsis minutis callosis acutis 0.5 mm longis, 2-4 mm inter sese distantibus; pennatinervis, adaxiale plana nervis parum notatis, praecipue costa pilosa, reliqua glabra; abaxiale costa robusta eminenti nervis secundariis 10-11 paribus prominentibus, ascendentibus, arcuatis anastomosantibus, nervis tertiis et minoribus in reticulum prominulum, laxiusculum anastomosatis, costa dense crassi-pilosa, reliqua superficie sparse pilosa pilis distale setosis fragilibus apice acuto basi tuberculato-conica persistenti.

Inflorescentia corymboso paniculata composita terminalis, 11-14 cm ampla, densa et floribundissima valde ramosa ramis ramulisque numerosis congestiusculis tomentulosis et bracteosis. Bracteae foliosae, structura et forma folia simillissima, sed sursum gradatim breviores; bracteolae lineares, 5-2 mm longae. Pedicelli graciles erecti 1.5-5 mm longi tomentulosi.

Capitula feminea 6-8 mm longa, discoidea, 6-12 flores pistillatos ferentia. Involucrum tubulosum 6-7 mm longum 2-2.3 mm diametro, 26-29 phyllariis 7-8 seriatim imbricatis. Phyllaria rigide paleacea, dorso brunnescentia marginem straminea, exteriora ovata vel elliptica, minute acuteque apiculata, concava 1.8-2 x 1 mm, marginibus sursum lacerato-ciliatis, setis acutis antrorsis; interiora 5.5-6 mm longa 0.6-0.7 mm lata, acuminataque subplana, quam externa magis tenera et pallidiora. Flores feminei corolla capillari-tubulosa 3.2-3.5 mm longa apice irregulariter 5 dentata lobulis brevissimis obtusiusculis, distale pilosula pilis cellulis uniseriatis, crassiusculis antrorsis erectis vel tortuosis 0.3-1.5 mm longis. Stylus 4.6-5 mm longus corollam valde excedens apice bifidus lobis lineari-lanceolatis 0.45-0.5 mm longis, basi leviter ampliatus bulbosus. Ovarium anguste oblongum 0.8-0.9 mm longum 5-nervatum glabrum, apice obtusum, basi callosa cellulis 2-3 seriatis annularibus. Pappus im vivo candidissimus, in herbario stramineus, 5-6 mm longus sed pilis inaequilongis copiosis uniseriatis strigosis basi crassioribus breviter coalitis.

Typus: Peru, Dep. Ayacucho, Prov. La Mar: eastern Massif

of Cordillera Central opposing the Cord. Vilcabamba, between Tambo Sn. Miguel and Hacienda Luisiana; in grassland above timberline on exposed summit ridges and slopes of puna, at Punccu, 3400-3600 m alt along Inca trail c. 30 km Hacienda Sta Rosa, 10 km from Tambo; 6 ft. perennial with dark, glossy green leaves, pappus white. 24 Aug 1968, T.R. Dudley 12005, Holotype USNA; isotype US.

Baccharis ayacuchensis belongs to the section Pinnatae Cuatr. which includes B. buddleioides HBK and B. pentlandii Dc. It is well distinguished by its narrow lanceolate, acute short-petiolate leaves, the large terminal corymboid inflorescences, the narrow cylindrical involucre and the low number of female flowers.

BACCHARIS DUDLEYI Cuatr. sp. nov.

Frutex scandens, ramis ochraceo-viridibus breviter strigosis pilis acutis circa 0.1 mm longis, terminalibus angulato-flexuosis ramulis floriferis patulis vel reflexis. Folia alterna petiolata luteoloviridia. Lamina coriacea flexibilis in sicco viridi-ochracea, lanceolato elliptica, 7-12 mm longe acuminata, basi attenuata obtusiuscula vel obtusa, apice acutissima 5-11 cm longa, 2-3.5 cm lata (7-12 mm longe acuminata), margine integerrima, utrinque puberulo-strigulosa pilis crassiusculis subadpressis sparsis sed ad costum copiosis, etiam sparse glandulata, glandulis minutissimis globosis sessilibus vel immersis resiniferis, nitidisque; costa subtus prominenti nervis secundariis 6-8 utroque latere prominentibus subpatulis arcuatis anastomosantibus, nervis tertiis minoribusque laxiuscule reticulatis, reticulo minusculo prominulo bene conspicua, superficie abaxiale minute sparse glandulosa. Petioli 5-10 mm longi tereti minute striguloso-puberuli. Inflorescentiae at terminationes ramulorum, axillares et terminales, racemiformi-paniculatae valde patentes plerumque reflexae, capitulis breviter pedicellatis vel subsessilibus plerumque 3-5-glomeratis.

Capitula mascula ante anthesin (alabastra) 3.7-4.5 mm longa 1.4 mm lata cylindracea. Involucrum 20-23 phyllariis pluriseriatis imbricatis scariosis ad apicem attenuatis minute pilosiusculis, proximalibus ovatis rigidis concavis 1-1.5 x 0.2-1.2 mm, subobtusis, medialibus circa 2 x 1.2 mm ovatis subacutatis, distalibus ellipticis vel oblongo-ellipticis 2.8 x 0.6-1 mm, acutis omnibus circa apicem apiceque breviter ciliatobarbatis. Flores masculi 3-4 in capitulo. Corolla ante anthesin tubo brevissimo sed lobis 1.5 mm longis lanceolato-linearibus acutis marginibus incrassatis, abaxiale pluribus glandulis globosis circa 0.05 mm diam valde conspicuis, ad apicem plerumque 1-2 pilis unicellularibus crassis rigidis acutis erectis 0.1-0.2 mm longis. Antherae immaturae 1.5 mm basi minute auriculatae. Stylus ramis lance-linearibus acutissimis 1 mm bene liberis dense papilloso-hispidulis. Rudimentum ovarii pubescente pilis uniseriatis longiusculis.

Typus: Peru, Huánuco, southeastern slope of Rio Llulla Pichis watershed, on the ascent of Cerros del Sira, in open and

drier ridges and banks in cloud forest about halfway between Laguna and Peligroso, 1450 m, 23 Jul 1969, T.R. Dudley 13183; holotypus NA. Paratype: same locality, on edges of sharp ridges (cejas); 1350 m, high climbing prolific dense vine in dense elfin forest ("monte chico"), 24 Jul 1969, T.R. Dudley 13238; paratype, NA. Other specimens, same localities, Dudley 13045, 13173 (NA).

Baccharis dudleyi is most peculiar on account of the zig-zag shape of the fertile branchlets, the distal axillary inflorescences being strongly patent, mostly retroflex. This disposition frequently found in Archibaccharis, is rather rare in the genus Baccharis. The shape and structure of the leaves of this new species is also characteristic, the glandular punctuation, the shortly strigose puberulence, the extremely reduced number of flowers (3-4), and the features of the corolla make this species unique. Only when mature male flowers and female specimens are available will be possible to determine the true affinities of B. dudleyi within the genus.

BACCHARIS DAVIDSONII Cuatr. sp. nov.

Fruticulum parvum prostratum caespitosum interdum pulvinatum, caule valde ramoso glabro ramis ramulisque intricatis, ramusculis ultimis rosulas minusculas terminales dense foliatas virides ad solum visu sessiles et congestas efferentibus. Rosulae 10-15 mm diametro, foliis numerosis cum vaginis amplectentibus congeste imbricatis, spiraliter multiseriatis densissimeque dispositis, distale visu laeteviridibus, proximalibus vetustis marcescentibus caulem tegentibus.

Folia in totum 7-10 mm longa; lamina 4.5-6 mm longa 1.5-2 mm lata, crassa subcoriacea rigida patens, linearis apice subobtusa vel subacuta glabra adaxiale laevis subnitidaque, abaxiale tantum nervo medio profunde impresso conspicua, basi in vaginam gradatim ampliata producta. Vagina membranaceo - crassiuscula 2.4-3.5 mm longa 2-2.5 mm lata, marginibus tenuioribus hyalinis nervo medio bene notato.

Capitula solitaria terminalia a centro rosularum singula producta; mascula semiglobosa 7-8 mm alta 7-8.5 (-9) mm lata, 50-60 flores ferentia (exceptione tantum 22-24 flores). Involucrum 6-7 mm altum phyllariis rigide membranaceis 3-4-seriatis exterioribus oblongo-ovatis vel ovatis 4-4.5 x 2 mm interioribus 12-14 subsequilongis circa 5 x 1.5-1 mm, oblongo-ellipticis apice subacutatis obnibus marginibus hyalinis sursum lacerato-ciliatis dorso brunnescentibus, intimis ad apicem plus minusve purpurascentibus. Receptaculum planum pleruruque 3.5-4 mm diam (-2.6 mm), alveolatum marginibus alveolorum membranaceis acute lacerato-dentatis projectionibus inaequalibus acutis 0.5-1.5 mm longis.

Corollae masculae 4.2-5 mm longae parte media copiose pilosulae pilis crassius culis obtusis pluricellularibus biseriatis 0.05-0.4 mm longis, tubo crasso, limbo infundibulformi lobis oblongo-triangulatis 1-1.2 mm longis abaxiale sparsis minutis pilis crassis biser-

iatis 0.005-0.1 mm longis. Antherae 1.5 mm longae basi breviter auriculatae, appendicibus apicalibus angustis acutiusculis 0.2-0.3 mm longis. Stylus crassiusculus distale dense papilloso-pilosus, apice breviter divisus. Ovarium rudimentarium brevissimum glabrum. Pappus albus setis teneris uniseriatis strigosis 4-5 mm longis, apicem ampliatis. Capitula et flores feminei ignoti.

Typus: Peru, Dept. Junin, route 20A trans-Andean from Linea to La Oroya km 125 E of Casapalca; cold boggy seepage and small stream in linestone and red clay; West slope at head of small valley 14250 ft elev.; vegetation of Chuquiraga oppositifolia, Azorella caespitosa and Distichia muscoides; cespitose stems branching underground. 11 Nov 1979, Ch Davidson a J. Jones 9000; Holotypus, US.

This Peruvian species is remarkable for its fruticulous, woody, prostrate, semisubterranean habit (cryptofrutex). The many intricate, lignous branchlets, are each terminated by a minuscule perfect crowded rosette 10-15 mm diam. They may cover the ground forming cespitose patches with each rosette very conspicuous. This taxon is closely related to Baccharis acaulis (Wedd. ex Fries) Cabrera, from the Andes of Jujuy and Salta (Argentina) and Laracaja (Bolivia). It differs by the woodier nature of the plant, and the more robust ultimate branches which support larger and thicker rosettes (up to 15 mm wide). The leaves are thick and rigid up to 10 mm long, the lamina is up to 6 mm long by 1.5 (-2) mm wide. The male heads of 7-8 (-9) mm diam are singly sitting at the center of the rosettes, usually they carry 50-60 flowers, the corollas are 4.3-5 mm long, copiously hairy at the distal part of the tube and base of the limb, and the lobes are barbate outside. In all the specimens of B. acaulis observed, the branchlets are weaker and flexuous, the rosettes are smaller (5-8 mm wide), the leaves are thinner and unequal, the distal regular leaves of the rosettes have 3-5 mm long by 0.6-0.8 mm broad, somewhat flexible lamina, whereas some of the proximal leaves are longer (up to 14-15 mm), the laminas 10-11 mm long, slender and flexuous, the sheaths are 3-4 mm long, triangular, thinly scarious and hyaline up to 3-3.5 mm wide at base. The heads in B. acaulis are about 5 mm high x 4 mm wide with 15-38 flowers, the receptacle is 1-1.5 mm wide, the phyllaries are thinly scarious, the inner ones 4 x 1.2 mm, the external ones 3.6-4 x 1.2-2.2 mm. The corollas in B. acaulis are smaller and of weaker texture, 3.2-3.5 mm long including the 0.6 mm long lobes, with fewer and shorter hairs (+0.05 mm). Specimens examined of Baccharis acaulis: Fries 701, Jujui, Moreno 3500 mm, Argentina (US, isotype ♂). L.B. Smith 4659, Salta, San Antonio de los Cobres, Argentina (US, ♂). L.B. Smith 4666 Salta, Diego Almagro, Argentina (US, ♀). Asplund 5685, General Campers 4200, Bolivia (US, ♂).

BACCHARIS UNIFLORA (Ruiz & Pavon) Pers. Syn. Plant. 2:425. 1807.

Molina uniflora Ruiz & Pavon, Syst. Veget. 208. 1798.

Baccharis grindeliaefolia Wedd. Chl. And. 1:176-177. Nov. Type: Gay "Cordilleres du department de Cuzco". Peru. Photo F. M.-37720.

Ruiz and Pavon (l.c. 1798) gave a short diagnosis of Molina uniflora: "Molina foliis lanceolatis serrato-dentatis confertis sessilibus, pedunculis terminalibus squamosis unifloris. Planta fruticosa, quadripedalis". I have never been able to locate a R. & P. specimen attributed to this species. The localities cited by the authors are the hills around Tarma, and also the provinces of Curis (Ica), Huichay and Tarmatambo, what means a broad area for the species, but Tarma can be considered the type locality. A recently received specimen from Bernardi collected in Cordillera Negra (Ancash) agrees with the original description, having crowded leaves, almost imbricate, elliptic lanceolate, distally serrate in one branch, almost entire in another, and having the monocephalous peduncle terminal. Also, Ferreyra 7474, in US, with three long branches monocephalous, leaves oblanceolate and minutely serrate and sometimes entire, can be well place in this R. & P. concept; collection Ferreyra 5758 is simular. A Macbride specimen (1051) collected at Tarma, identified as B. grindelifolia, has several monocephalous branches with others polycephalous, the leaves being deeply serrate-dentate. It is so with many specimens identified correctly as B. grindelifolia which type is Gay, Cuzco (Photo F.M. 37720). The observation of all available collections show that the species is polymorphic varying from many headed branchlets more or less corymboid to others with few heads or a single one; the leaves vary from broadly lanceolate or oblanceolate, deeply dentate serrate to narrowly lanceolate or sublanceolate, and with shortly serrate to subentire margins. The conclusion is that B. grindeliaefolia Wedd. and M. uniflora R. & P. are forms of the same and single species. Especimens examined: Bernardi & al 16656, Callan 4220-4300 m, Cordillera Negra, regione Huaraz, 16-X-76 (US); Ferreyra 5758, Chiquian, Ancask, 3850 m, 15-IV-49 (US); Ferreyra 7474, Tallenga-Pachapaque, Ancask 3500-2600 m, 17-V-50 (US); Riccio & La Rosa 3581, towards Marca-Huamachuco, La Libertad 3300-3400 m, 23-II-67 (US); Macbride & Featherstone 2507, Catuc, 15 miles of Huaraz 10.500 ft. 4-X-22 (US); Macbride & Featherstone 1839, Mito, 10500 ft, VIII-22 (US); Soukup 1976, Huancayo, Junin, III-43 (US); Soukup 5575, Tocto, Ayacucho, 16-II-68 (US); Macbride 3043, Rio Blanco, 1500 ft. III-23 (US); Macbride & Featherstone 1053, Tarma, 13000 ft. VI-22 (US).

BACCHARIS Sect CYLINDRICA Heering

In my revision of the Baccharis of Colombia (1957) I erroneously typified the section Cylindrica Heering with Baccharis tridentata Baker which in no way agrees with my own description of the referred section. At the time of the typification, I had rather in mind using B. ulicina as the type species, but some confusion occurred while copying the drafts for the final text. Ariza

was correct in calling the attention about the error and he suggested another species for lectotype (Ariza, Las Especies de Baccharis de Argentina Central, Trab. Mus. Bot. Univ. Nac. Cordoba 3 (4):180. 1974. Argentina.)

DIPLOSTEPHIUM RANGELII Cuatr. sp. nov.

Frutex erectus valde denseque ramosus ad 1 m altus. Rami ascendentes, ramulis ramusculisque glabris glandulosisque, erectis dense foliatis, foliis antrorsis internodios breves tegentibus. Folia crasse coriacea rigida sessilia; lamina 4-8 x 1.2-2.2 mm, elliptico-oblonga basin versus attenuata, ad apicem angustata subacutata apice calloso, margine valde revoluto, adaxiale glabra viridis punctato-glandulata plus minusve glutinosa et resinoso-granulata, abaxiale dense congesteque albo-lanata costa viridula et glandulosa excepta; basi incrassata vaginantia.

Capitula radiata solitaria ad terminationes ramusculorum sessilia cum foliis supremis circumdata. Involucrum cylindraceum 11-12 mm altum. Phyllaria plerumque 18, 4-5-seriata, paleaceo-chartacea rigidula late lanceolata acuta vel acuminata, abaxiale sursum minute glanduloso-puberula, margine eroso-ciliata, proximalia magis rigida convexo-amplectentia sursum attenuata 5-7 x 2-2.5 mm, subininteriora 8-9 x 2-2.8 mm, intima tenera 8-10 x 2.5-1 mm. Receptaculum alveolatum marginibus alveolorum scarioso-dentatis.

Flores radii ligulati 5-12 in capitulo. Corolla alba 8-10 mm longa, tubulo 3.8-4 mm longo stricto, sursum copiose pilosula pilis glandulosis biseriato-cellulatis leviter flexuosis 0.2-0.3 mm long; lamina linearis vel lineari-elliptica 5-6 mm longa 1-1.5 mm lata apice obtuse minute tridentata. Stylus 7-8 mm longus, ramulis tenuibus 1.2-1.5 mm. Ovarium oblongum 1.5-1.8 mm longum 5-nervatum subglabrum, tantum parcissimis pilis gemmini-cellulatis rigidis antrorsis munitum. Pappus stramineus 6.5-7 mm longus, setis biseriatis, rigidis strictis strigulosis, apice acutis, exterioribus brevioribus.

Flores disci 3-8 in capitulo. Corolla circa 6.5 mm longa, tubulo 3 mm longo parcis vel copiosis pilis glandulosis 0.2-0.3 mm, limbo tubuloso glabro, dentibus triangularibus 0.5 mm longis marginibus incrassatis papillosisque, abaxiale in uno vel duobus lobis copiosis glandulis crassis subellipsoideis presentibus. Antherae 2.5 mm longae basi auriculatae, appendice apicale oblonga acuta 0.4 mm. Stylus basi bulbosus, distale ramulis circa 1 mm longis argute lanceolatis acutisque, abaxiale dense antrorse papilloso-pilosis. Ovarium sterile reductum ad 0.8 mm longum, basi calloso-incrassatum, sursum sparse pilosum pilis gemminis rigidis 0.15-0.2 mm. Pappus stramineus setis circa 6.5 mm longis, rigidis, strigulosis sursum lanceolato-dilatatis, apice acuto, parcis setis exterioribus brevibus (3 mm) teneris.

Typus: Colombia, Magdalena: Sierra Nevada de Santa Marta, Transecto de Buritaca, Filo La Cumbre, 3850 m alt. Arbustillo 1 m.

Ligulas blancas con tintes violáceos. Hojas blancuzcas por el envés, 19 Aug 1977, Orlando Rangel & Antoine M. Cleef 994. Holotypus US; isotypus COL.

Diplostephium rangelii belongs to the Series Lavandulifolia Blake. It is a rare endemic of the Sierra Nevada de Santa Marta "biologic island", very distinctive by many features from the other species of the section, mainly by the sessile heads, the reduced number of flowers in each capitulum, and the shape, size and structure of the leaves.

CONNARUS VENEZUELANUS subsp. ARAUCANUS (Cuatr.) stat. nov.

Connarus araucanus Cuatr. Brittonia 11:164. 1959.

Connarus venezuelanus var. orinocensis Forero, Brittonia 32:41. 1980.

Connarus araucanus was described originally from Cravo Norte, Arauca, Colombia, based on Gómez 16 (US, holotype). Dr. Forero has found recently that it is widespread throughout the Orinocia and neighboring places, being represented by many collections coming mostly from Venezuela. He considers it a variety of Connarus venezuelanus Baill. Forero finds that this taxon is easily distinguished from the typical C. venezuelanus by several consistent features. Because of this morphological characterization and its well defined natural geographic area it seems to me that the status of subspecies is more adequate for the concerned taxon than that of a variety.

BOOK REVIEWS

Alma L. Moldenke

"SHALLOW WATERS - A Year on Cape Cod's Pleasant Bay" by William Sargent, xix & 139 pp., 8 color plates, 100 b/w photo & 2 maps. Houghton Mifflin Company, Boston, Massachusetts 02107. 1981. $17.95.

Sargent's appreciation just glows from what he sees in nature through his own eyes, his diving goggles and his camera lenses, from what he has read as excerpted in his chapter headings, from what is part of his outlook on life as indicated in this book's dedication "To my son Benjamin, in hope that he will also love the bay" and from what he offers his readers of the intricacies and simplicity of plant and animal life on, in and near this bay. The text and beautiful illustrations are organized around the changes in the seasons. A lovely gift prospect!

"COEVOLUTION OF ANIMALS AND PLANTS" edited by Lawrence E. Gilbert & Peter H. Raven, xiii & 246 pp., 4 color photo, 4 b/w photo, 29 fig., 29 tab. & 1 map. University of Texas Press, P. O. Box 7819, Austin, Texas 78712. 1975. $12.50 hardcover, 1979. $9.95 paperbound.

This book is composed of the revised papers of camera-ready typed manuscripts presented at the First International Congress of Systematic and Evolutionary Biology, Symposium V. The general introduction stresses "the importance of coevolution as a dynamic process involving such diverse factors as chemical communication, population structure and dynamics, energetics, and the evolution, structure, and functioning of ecosystems....Indeed, coevolution really represents a point of view about the structure of nature which has just begun to be fully and rigorously exploited, and which holds great promise for the future." Some of the topics discussed are: biochemical coevolution between plants and their insect herbivores and seed predators, and coevolution between orchids and bees, ant-plant mutualism, butterflies and plants. The reasonable prices of both the hardcover and the newer paperback help to keep this book "moving" on the book shelves of college and university book stores, as well as the contents, of course.

"HORMONE ACTION IN THE WHOLE LIFE OF PLANTS" by Kenneth V. Thimann, xi & 448 pp., 249 b/w fig., 97 tab., & 91 photo. University of Massachusetts Press, Amherst, Massachusetts 01003. 1977. $35.00.

The author has long been world famous for his experimental and teaching career almost from the inception of this field - hormonal phytophysiology - which developed often under his graduate students in different places, on different plants and plant parts and for for differing goals. Giving this book form with its wider and longer circulation to a series of distinguished visiting professor lectures at the above university, Thimann's plan is "to visualize and integrate the multitudinous ways in which hormones initiate and control the growth and development of the higher plants..... from seed germination through all growth stages till the new seed has again freshly fallen on the ground". So the roles of auxins, cytokinins, etc., are told as far as known. "Wherever one studies the effects of these hormones, one is struck by the fact that they seem to control a number of processes which have no obvious relationship to one another....It is a principle in evolution, and certainly in biochemistry, that compounds become of great importance in biology if they do more than one thing....and are retained in evolution by the organism." This is a helpful integrative study.

"FORM AND PATTERN IN HUMAN EVOLUTION - Some Mathematical, Physical, and Engineering Approaches" by Charles Oxnard. ix & 218 pp., 129 b/w fig. & 12 photo. pl. University of Chicago Press, London & Chicago, Illinois 60637. 1973. $14.00.

It is good, indeed, that this valuable pioneering work is still available because it shows how the application of new tools and skills can give better and measured answers to many important questions of evolutionary development especially between function and morphology among anthropoid members. The text explains quite clearly complex metrical analyses of shape, multivariate morphometric analyses, techniques of data collection, combined use of multivariate and cluster analyses. experimental stress analysis, extrapolation to fossil finds, and optical data analysis. "An important bonus resulting from the use of methods such as these comes from the sense of community induced within scholars in different areas[esp. re primates].....Anatomists, physiologists and pathologists at the organismal and organ level meet with geneticists, biochemists and biophysicists at the molecular level, with psychologists, behaviorists, and sociologists at the behavioral grade."

"FUNGI - Delight of Curiosity" by Harold J. Brodie, xii & 131 pp., 22 b/w photo. pl. University of Toronto Press, Toronto, Ontario, Canada M5S 1A6 & Buffalo, New York 14203. 1978. $10.00.

With its effectively printed photographic plates and with its curiosity-whetting stories of adaptations among certain fungi, this

book is itself a delight for those who read it whether they have not really noticed these creatures before or had spent a professional lifetime studying them. The dozen chapters have such titles as: Gunnery in the Fungus World, Ants' Fungus Gardens, Sphere Thrower.

"THEORETICAL SYSTEMS ECOLOGY - Advances and Case Studies", edited by Efraim Halfon, xvi & 516 pp., 44 b/w tab., 98 fig. & 1 map. Academic Press, New York, N. Y. 10003. 1979. $46.00.

"This volume includes original contributions in theoretical systems ecology which are important as a basis for future developments." In the Preview it makes an excellent advanced text because it delineates and evaluates several different methods for several different types of problems. Part I consists of 3 papers by 5 authors on Aggregation and Organization such as "Use of First Order Analysis in Estimating Mass Balance Errors and Planning Sampling Activities". Part II concerns Model Structures, Formalisms and Theory of Modeling in 6 papers by 7 authors as "Hierarchical Adaptability Theory". Part III has 4 papers by 8 authors of System Identification such as "Structural Identifiability of Linear Compartmental Models. Part IV covers Model Analysis, Control Theory and Stability in 7 papers by 8 authors such as "Stability of Holistic Ecosystem Models". The more advanced mathematics, systems analysis and computerization theory and skills you know, the easier it will be to understand this carefully prepared book.

"FLOWERING PLANTS OF MASSACHUSETTS" by Vernon Ahmadjian, xxv & 582 pp., over 279 b/w line draw. University of Massachusetts Press, Amherst, Massachusetts 01003. 1979. $14.95.

Ah, but this is a lovely book for a vacation time companion, while sitting on a porch reading or during the rain or snow when one - amateur or professional - cannot be in the field observing or collecting! This book should be kept as a special one second to a regular key used in the field such as Fernald's 8th edition of Gray, Gleason's Britton & Brown, Seymour's Flora of New England, etc. About 500 common plants in 93 families are described and over half are beautifully illustrated on fullpage plates by Barry Moser. The keys are simple to follow. This book would make a lovely gift to a naturalist-friend or even to yourself.

"VEGETATIONS-ÖKOLOGIE DER TROPEN" by Volkmar Vareschi, 294 pp., 12 color photo., 161 b/w fig. & photo., 21 tab. & 4 maps. Eugen Ulmer, Gnbtt & Co., Postfach 10/32, 7000 Stuttgart,

West Germany. 1980. DM. 96.

This ia a particularly well-prepared text with pertinent, ef-. fective illustrations. It is reminiscent of the thoroughness of the preceeding few generations of Germany's schools of plant geographers, but it is also modern in its approach and outlook. It discusses the different types of higher plant structure in the tropics, in terms of water availability (monsoons, rivers, swamps, deserts, rain forests) and soil types with special details given for the Venezuelan Andes where the author has worked. The other sections deal with diversity and productivity of tropical vegetation.

"MORPHOLOGIE DER BLÜTEN UND DER BLÜTENSTÄNDE" by Focko Weberling, 392 pp., 392 b/w fig. & photo. Verlag - Eugen Ulmer, Postfach 700561, 7000 Stuttgart 70, West Germany. 1981. DM. 108.

This carefully prepared text is reminiscent of Goethe's limitedly available famous work on plant structure with perhaps fullest emphasis on floral parts. This one is very well illustrated with many clear line-drawings and photographs. The text describes the basic floral members, their ranges of variation throughout the plant kingdom, the use of this information for classifying plants, the branching and style of inflorescences, pollen transfer, and seed and fruit dispersal. Since fewer American college and university students are able to read German now, a paperbound English language translation might prove advantageous for the publishing house and and non-German-reading students. Fortunately much information can be gleaned from the illustrations alone.

"LUCRARILE GRADINII BOTANICE DIN BUCURESTI" or "ACTA BOTANICA HORTI BUCURESTIENSIS 1979-1980", 248 pp., 37 b/w fig., 27 tab., 41 photo. & 3 maps. Published by the Ministry of Education of the Rumanian Socialist Republic for the Botanical Garden of the University of Bucharest. 1981.

The 26 papers in this volume In Rumanian, French, German or English feature the 120th year of uninterrupted service of the Botanical Garden of the University of Bucharest, its 500,000 specimen herbarium, its research work and its agricultural educational programs. The contents of each volume since 1961 are listed at the back of this book. Some of the contents of this current volume include such topics as: electron microscopy of peroxysomes and catalase location in nectaries of *Tilia platyphyllos* with fine EM photography, *Callicarpa* as a new horticultural introduction, wild medicinal plants from south of the Vilcan Mountains, of Gorj department, and of Mehedinti district. Some parts of this publication have been proofread more carefully than others.

"PATTERN AND PROCESS IN A FORESTED ECOSYSTEM - Disturbance, Development and the Steady State Based on the Hubbard Brook Ecosystem Study" by F. Herbert Bormann & Gene E. Likens, xii & 253 pp., 72 b/w fig.. 27 tab., 19 photo. & 1 map. Springer-Verlag, Heidelberg, Berlin & New York, N. Y. 10010. 1979. $19.80.

"This volume has as its major concern the presentation of an integrated view of the structure, functions, and development of the northern hardwood ecosystem. It concentrates on the interrelationships among biogeochemical processes, animate and inanimate structure of the ecosystem, species behavior within the ecosystem, and how these relationships change through time following a perturbation." The carefully studied model has 4 stages of development: 1st - Reorganization of 1--2 decades after clear-cutting when the ecosystem loses total biomass despite accumulation of living biomass, 2nd - Aggradation of more than a century when the ecosystem accumulates total biomass reaching a terminal peak, 3rd - Transition of variable time length when the total biomass declines, and 4th - Steady State when total biomass fluctuates about a mean. The book has some particularly well conceived and constructed diagrams.

"VEGETATION OF THE EARTH - and Ecological Systems of the Geobiosphere" Second Edition by Heinrich Walter, translated from the Third Revised German Edition by Joy Wieser, xx & 274 pp., 124 b/w fig., 26 maps, 7 tab. & 33 photo. Springer-Verlag, Heidelberg, Berlin & New York, N. Y. 10010. 1979. $13.90 paperback.

This outstanding book belongs on the reading list shelf or as the main text or in the student's or scientist's personal library if this broad topic or any part thereof is being studied or researched. It points out the basic principles learned since the time of Haeckel and the need for broad field experiences. The first illustration is a world map locating the many field stations, etc., where the author has studied for almost half a century. "Das Laboratorium des Ökologen ist Gottes Natur und sein Arbeitsfeld - die ganze Weld." "The ecologist can only carry out his investigations on real ecosystems and not on abstract models thereof.....Such models can never completely describe real situations but, if based upon sufficient data, can help toward a better understanding of ecosystems." At the outset definitions and limits of terms and processes are clearly set and given coded letters and numbers that are easy to memorize if one is going to study this text or field seriously. Zonobiomes (VI of the Temperate-Nemoral Climate and VII of Arid-Temperate Climate) have interconnecting transitional Zonoecotones (of Forest-Steppe). Even though 90 percent of the earth's biomass is phytomass, man in his swelling percentage of the small remainder seriously threatens the future.

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